Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

MARCH, 1941

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L. PERIODICAL DIV.

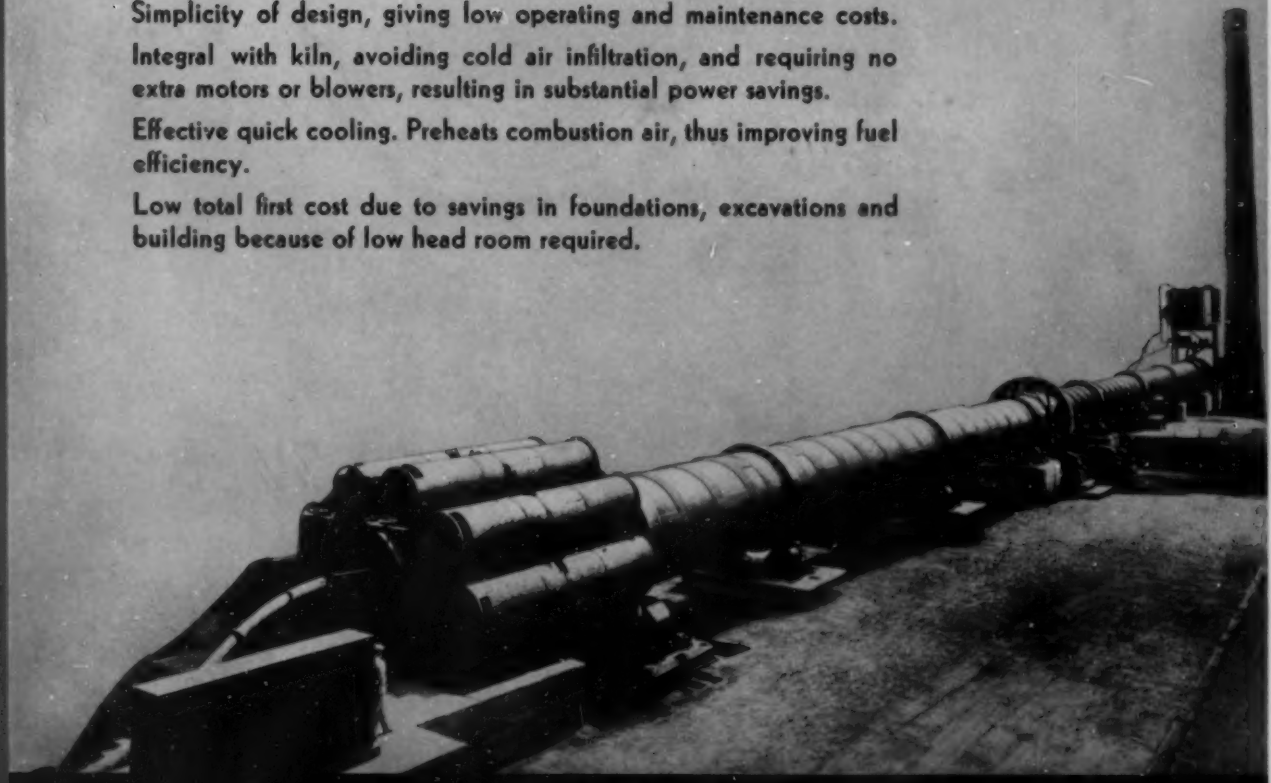
UNAX ROTARY KILNS

Simplicity of design, giving low operating and maintenance costs.

Integral with kiln, avoiding cold air infiltration, and requiring no extra motors or blowers, resulting in substantial power savings.

Effective quick cooling. Preheats combustion air, thus improving fuel efficiency.

Low total first cost due to savings in foundations, excavations and building because of low head room required.



F. L. SMIDTH & CO.

60 EAST 42ND STREET — CEMENT ENGINEERING, CEMENT MACHINERY — NEW YORK, N. Y.

WILL YOUR CRUSHERS *Do This?*

HANDLE LARGER ROCK

REDUCE TO DESIRED SIZE IN ONE OPERATION

BETTER CONTROL OVER SIZE OF PRODUCT

MAKE CUBULAR STONE NO SLIVERS

25% TO 75% LESS INVESTMENT CHEAPER CRUSHING

ONLY ONE CRUSHER NEEDED FOR THE JOB

THE "SLUGGER" crushes ONE MAN size rock to 1¼"—¾" or agricultural limestone in One Operation. By reducing large stone to these sizes in one operation the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment. Built in Seven Sizes—6 to 150 tons hourly capacity.

THE "JUMBO" crushes ¾ yd. to 1¼ yd. Power Shovel Loaded Rock to 1¼" in ONE OPERATION. By doing all the work in one operation with one crusher there is a considerable reduction in the costs of foundations, drives and buildings as well as power requirements. Six Sizes—50 to 300 tons hourly capacity.

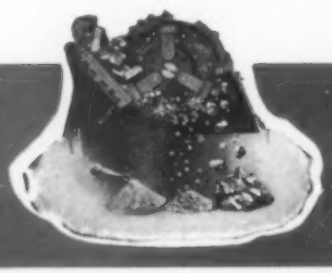
FOR a recrusher for reducing 5" stone to 2", 1½" or agricultural limestone the Williams "NF" type is the most efficient and economical on the market.

FOR handling wet, muddy rock the Williams "NON-CLOG" cannot be surpassed. Pushing rams prevent material from clogging.

Write today for additional information on any of the above crushers

Open view of Williams "Slugger" crusher showing Heavy duty hammers, liners and discs.

Sectional view showing Williams Hammer Principle of crushing.



THE WILLIAMS PATENT CRUSHER & PULVERIZER CO.

800 St. Louis Ave. St. Louis, Mo.

Sales Agencies Include

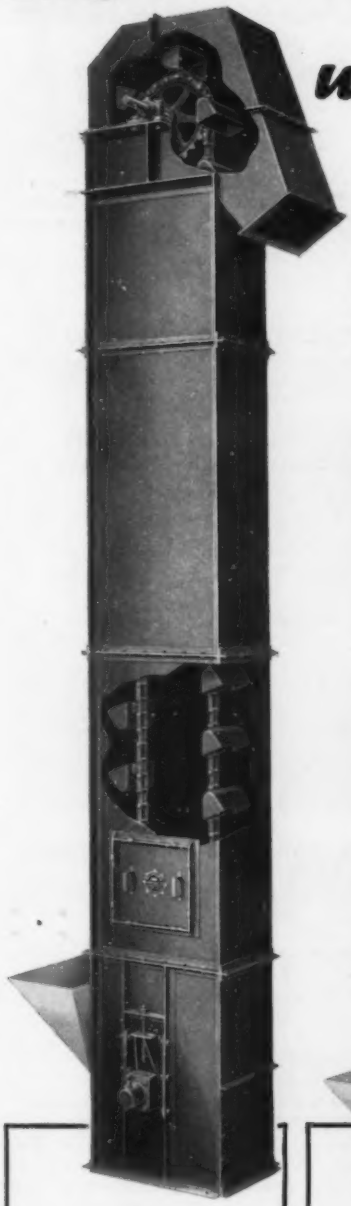
CHICAGO	NEW YORK	OAKLAND, CALIF.
37 W. Van Buren	15 Park Row	1629 Telegraph Ave.

Williams

QUALITY AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

PATENT CRUSHERS GRINDERS SHREDDERS

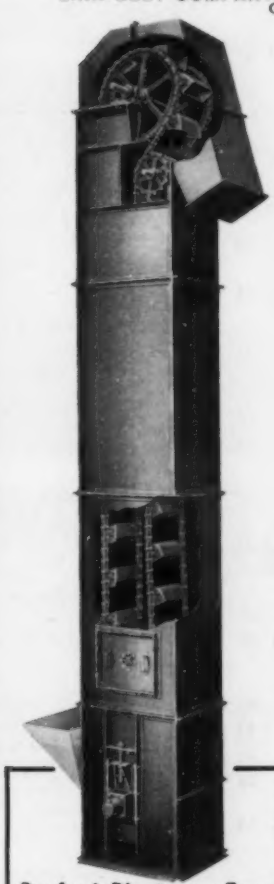
Lower Maintenance-Longer Life
with LINK-BELT
BUCKET ELEVATORS



Link-Belt engineers have had extensive experience in the design, manufacture and application of bucket elevators for varied service requirements. If your materials handling conditions require the use of a bucket elevator let Link-Belt show you the most efficiently performing size and type for your needs.

Refer to pages 862-916 of Link-Belt General Catalog No. 800 for complete engineering data, specifications and information on how to select bucket elevators.

LINK-BELT COMPANY, Chicago, Indianapolis, Philadelphia, Atlanta, Dallas, San Francisco, Toronto. Offices, warehouses and distributors in principal cities. 8475



Centrifugal Discharge Type
for General All-Around Service

Malleable iron or steel buckets mounted on chain or belt. Loaded by materials flowing into buckets, or by digging or scooping up under the foot wheel. The material is discharged by centrifugal action as buckets pass over the head wheel.

Perfect Discharge Type
for Fragile, Sticky, Powdered, Fluffy or Sluggish Materials

Malleable iron or steel buckets are carried between two chains, snubbed under head wheels to inverted position over the discharge chute. This provides a "perfect" or positive discharge of material. Ideally suited for handling materials which are sluggish in discharge.

Vertical Continuous Type
for Light, Fluffy or Pulverized, and Friable Materials

Steel buckets are usually used and are mounted continuously on chain or belt, and loaded by material flowing into buckets. Spillage is prevented by their close spacing, and at the sides and front by a loading leg. Inclined types (without casings) also available for sand, gravel and stone.

Vertical Super-Capacity Type
where Large Capacities are required

This type is suited for handling fines or large lumps, or both. Buckets are made of steel, similar to continuous type, but carried between chains in such a position as to hold the maximum capacity for minimum weight and space. Also made in INCLINED type (without casings) with head machinery independently supported.

A TYPE AND SIZE FOR EVERY SERVICE AND CAPACITY

MAR 17 1941

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Rock Products

Recognized the World Over as the Leader in Its Field

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 44, NO. 3, MARCH, 1941

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ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.

Impartial measurement of reader interest in terms of paid circulation.

★

Authentic facts relating to editorial scope and readership analysis.

(PUBLISHED MONTHLY AT CHICAGO, ILL., U. S. A.)

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An *All-Wheel-Drive* TRUCK -you can AFFORD to Buy, and CAN'T AFFORD to be without!

If you have a job where two driving wheels are not enough—and you can't afford or use a big *All-Wheel-Drive* truck—get a demonstration of a Marmon-Herrington *All-Wheel-Drive* converted Ford!

You'll be amazed how much bigger loads you can haul through loose sand, gravel, mud, dirt or snow. You'll be surprised with the number of extra trips you will make in a day. You'll be astonished at the ability of these vehicles to climb out of pits and dumps, to travel with greater safety on slippery highways, to operate under-body graders or to push snow plows through heavy drifts.

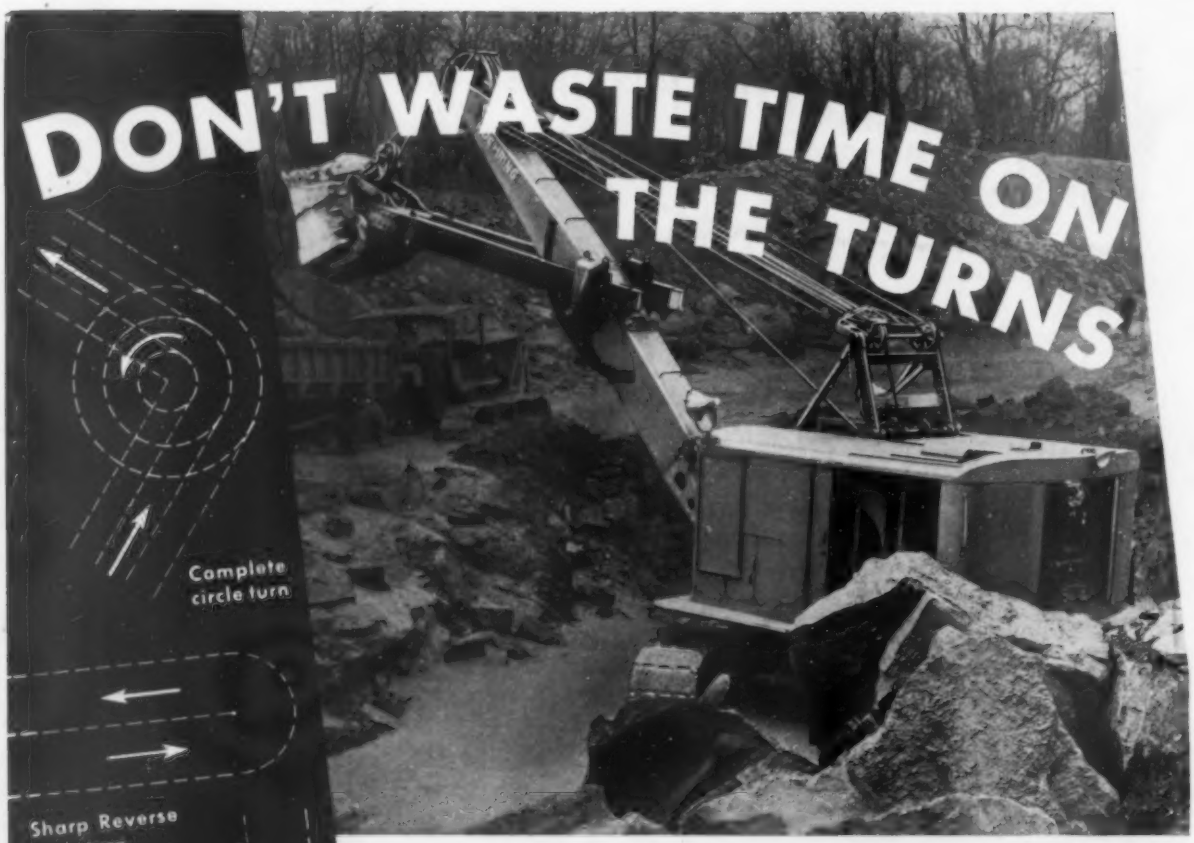
And best of all—you'll be surprised at the startlingly low price and operating cost, as compared to any other *All-Wheel-Drive* vehicles on the market.

For Marmon-Herrington *All-Wheel-Drive* converted Fords have all the inherent virtues and advantages of standard Fords—*plus power and traction applied through all four or all six wheels.* The result is more effective power, greater ability and greater economy of operation than you would ever believe. They incorporate the same outstanding features of design and construction which are found in Marmon-Herrington Heavy-Duty *All-Wheel-Drive* Trucks, built in the same plant by the same workmen.

Write for literature showing these vehicles in action, and the name of the nearest Marmon-Herrington dealer. Cable address MARTON.

MARMON-HERRINGTON CO., INC. • INDIANAPOLIS, INDIANA, U. S. A.

DON'T WASTE TIME ON THE TURNS

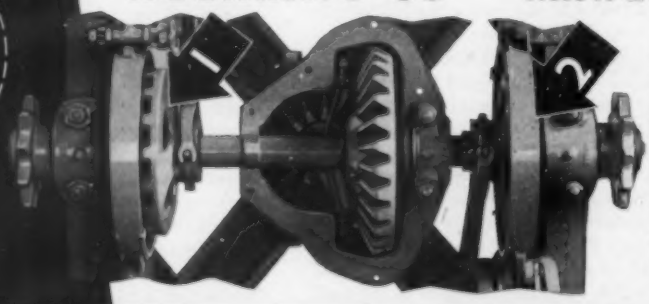


FULL SPEED AND POWER AHEAD—

Koehring does not need to "jockey", maneuver or make time-consuming, unnecessary moves to reach any section of the cut. Koehring travels the shortest way to the loading point. Turns are made directly . . . on grade or level . . . ***saving time!*** Tight places are no hindrance to a Koehring.

Watch a Koehring move and see the difference.

KOEHRING CO • Milwaukee



1. Positive jaw-clutch on ends of shaft engage for full power application with friction clutch control.

2. Positive brakes, controlled by lever, on end of shaft hold one or *both* crawlers as required.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

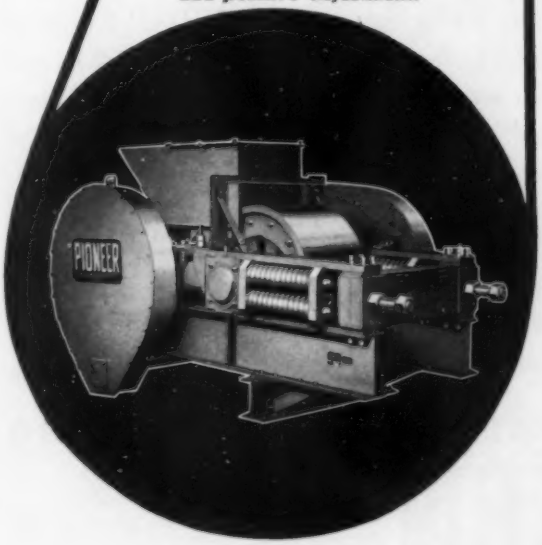
PIONEER *Foto Facts*

NUMBER TEN

✻ PROFITS ARE MADE IN THE *EXTRA TONNAGE* PRODUCED—

ONE OF THE SECRETS OF *Extra Tonnage* IS THE SECONDARY ROLL CRUSHER.....

The Pioneer 40x22 Roll Crusher is extra heavy for the tough jobs. It has manganese steel shells 40" in diameter and 22" face—all gear drive—spring release for safety—and positive adjustment.



Producers have found that the big profits are made in the extra tonnage that they produce. By changing certain units in this plant, the owner was able to double his output. The overhead remained the same and the result was greater earnings.

Here's how he did it:

A Pioneer Traveling Grizzly Feeder that handles the Feed economically and efficiently.

A Pioneer Primary Crusher — size 24"x36", that is big enough to take the large rocks and fast enough to keep ahead of the rest of the plant.

A Pioneer 4'x12' Vibrator Screen with a ***split feed*** arrangement which ***doubles*** the effective screen area.

A Pioneer 40"x22" Super Roll Crusher for the secondary crushing. It takes the oversize from the two decks of the screen and crushes to the finished product size.

A Belt Conveyor System that conveys the material between the crushers and screen.

By adding the Traveling Grizzly Feeder and these larger Crushers, he stepped his production up from 800 to 1600 cubic yards of rock per day. The big profits are made in the extra 800 cubic yards.

PIONEER ENGINEERING WORKS

MINNEAPOLIS · MINNESOTA

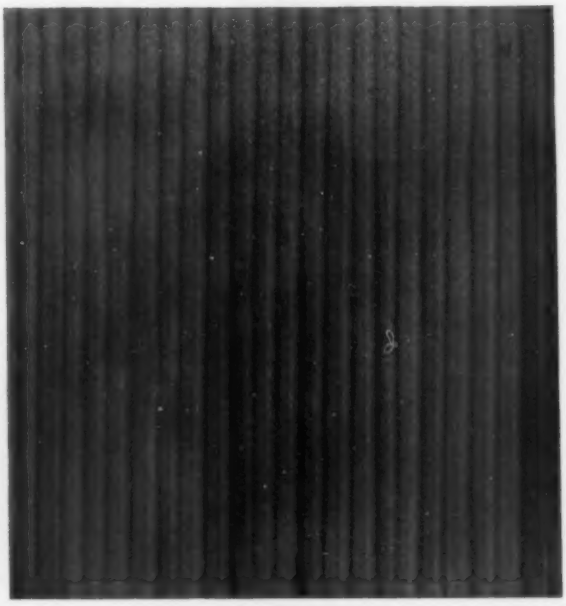
DIMENSIONAL QUARRYING THE OLD WAY

Disadvantages

Rock bits forged as an integral part of hollow drill steel rods are a constant headache to dimensional stone quarry operators. In granite formations gauge losses are so great that the hole must be "stepped-down" by using smaller and smaller gauges. Consequently the cores between the holes become progressively larger (see cut above) and must be "worried out" with broaching tools. Moreover, material losses are high because many uneven fractures are obtained.

Because it is necessary to frequently change bits, operators are forced to carry an enormous steel inventory.

DIMENSIONAL QUARRYING THE TIMKEN BIT METHOD



Advantages

TIMKEN Removable Rock Bits have taken the headaches out of dimensional stone quarrying because they drill constant gauge holes (see cut above).

Here is why they can do it. TIMKEN Bit gauge losses on the same footages obtained with forged bits are inconsequential because TIMKEN Steel and TIMKEN Bit design have very high resistance to wear. Thus when a new or reconditioned TIMKEN Bit begins to dull it is removed and replaced with another one of *identical* gauge. This results in constant gauge holes, simplification of subsequent broaching operations and even fractures with minimum material losses.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

ROCK BITS

Doing a Good Job

with this

MULTI-STAGE FINE REDUCTION CRUSHER

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators
Welded or Riveted Stacks, Tanks and Bins for any purpose.

For the better part of a year, a 3'0" Traylor-Stearns Multi-Stage Fine Reduction Crusher has been doing a good job crushing hard sandstone. The followng is typical of results secured:

Feed	2½"
Setting	5/16"
Thru 1"	99%
Thru ¾"	87%
Thru ½"	57%
Thru ¼"	21%
Thru 8 M.	9%
Product cubical	

The Multi-Stage has the following features:

1. Upper Stage does 50% of required crushing and supplies Lower Stage with sized feed in correct quantity
2. Non-Chokable at any setting
3. More output per horsepower
4. Pat'd. Bell Head and Curved Concaves
5. Easy Adjustment Devices
6. Shock Absorber Suspension
7. Automatic Force Feed Lubrication
8. Absolute Dust Exclusion
9. Roller Bearing Countershaft
10. Cast Steel Frame

SEE OUR BULLETIN No. 113

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ENGINEERING & MANUFACTURING CO.

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REALLY NEW!

Homocord

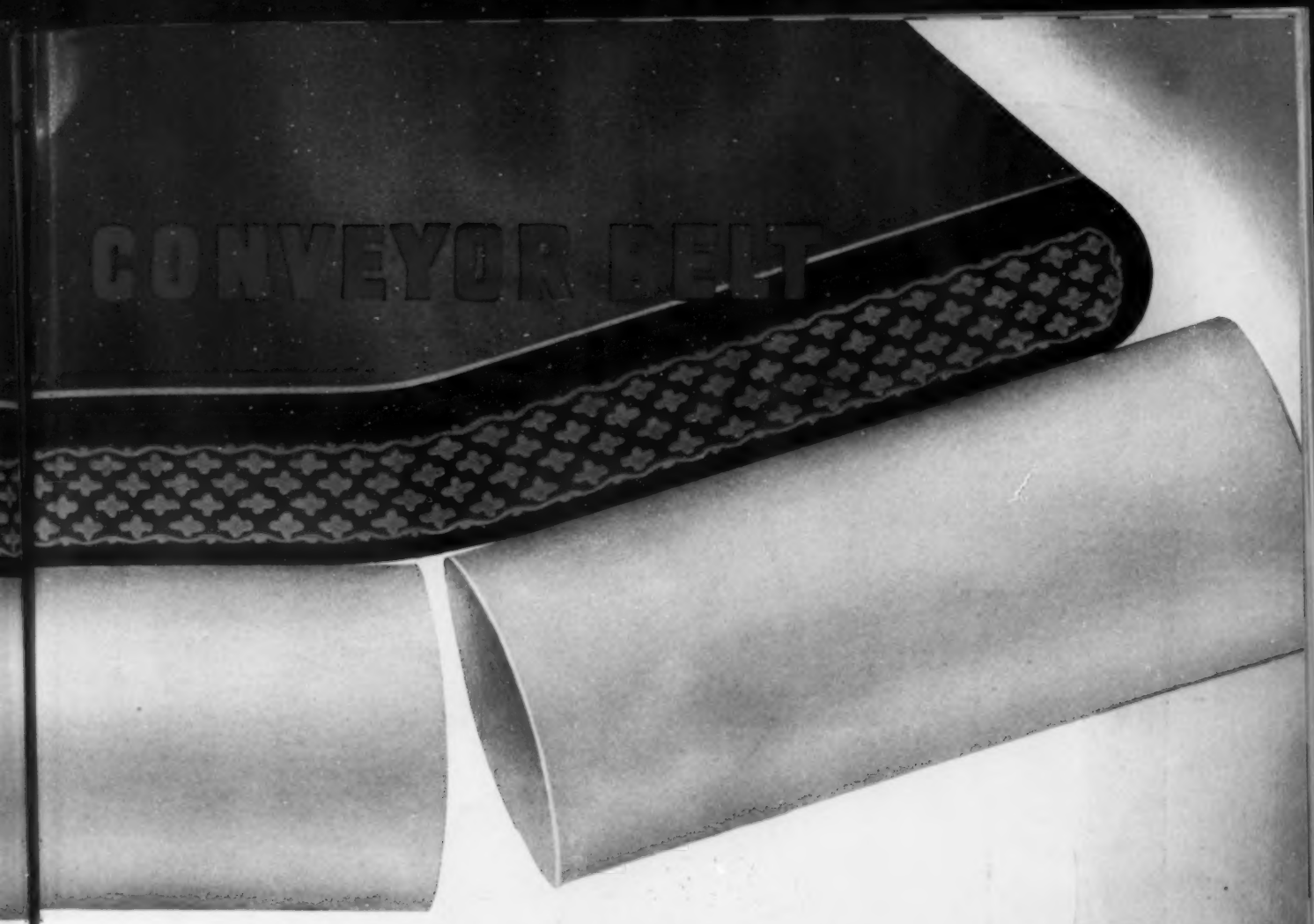
(Patent Applied For)

Homocord construction has been invented and perfected by MANHATTAN engineers, particularly and only for Conveyor Belt use and it is not designed for use in any other product.

Its characteristics fulfill every demand of conveyor service through correct proportioning of lengthwise and crosswise strength and flexibility, low inelastic stretch, cushioning to dissipate impact and resist fatigue, and through other essential qualities. It holds metal splice fasteners and is also ideally constructed for vulcanized field splicing.

THE MANHATTAN RUBBER
OF RAYBESTOS

Executive Offices and Factories
17 Townsend Street, Passaic, New Jersey



Feel Its Rippling Muscles

See its brawny sinews.
Examine its homogeneous structure.
Note how naturally it troughs.
Hear the convincing story.

TRY IT **USE IT**

MANHATTAN representatives will gladly show you samples and supply detailed information.

"The old order changeth, yielding place to new."

KEEP AHEAD WITH MANHATTAN

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MANHATTAN, INC.

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The list of Fuller Air-Quenching Cooler installations is still growing rapidly . . many good reasons for the popularity and general acceptance of this latest, efficient cooler, a few of which are: Mechanical simplicity . . . first cost low . . . comparatively little maintenance . . . operation under direct observation . . . low power requirements . . . high and uniform combustion air temperatures . . . production of clinker of high glass content . . . uniformly well burned clinker.

Our engineers are at your service . . . no obligation to you . . . let us know what you have in mind.

FULLER COMPANY
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Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

CO-7

TRAXCAVATOR*

THRIFTY TONNAGE

Stone, Sand and Gravel

● These two TRAXCAVATORS are setting low-cost loading records on the Coachella Branch of the huge All-American Canal. The Model T4 loads rock at the quarry for canal lining . . . averages over 800 tons in 8 hours. The Model T2 loads trucks successively from four huge stockpiles—three of gravel and one of sand, and all more than a city block long. Working 18 hours a day this machine handles the entire job, for its fast loading and traveling speeds make separate loading equipment for each pile unnecessary. TRAXCAVATORS can save for you too — their versatility, speed and low operating costs pay real dividends. They dig, load and carry, strip overburden, shift tracks, clean-up, maintain haulage roads and do many other tasks efficiently at low cost. Available in three sizes, ½ to 2½ cubic yard bucket capacities. See your "Caterpillar" dealer or write TRACKSON COMPANY, Milwaukee, Wisconsin, U. S. A.

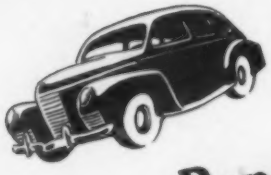
*REG. U. S. PAT. OFF.

DIG · GRADE · LOAD
CARRY · SPREAD
LEVEL · BULLDOZE
STRIP OVERBURDEN
MOVE TRACKS
BUILD ROADS
CHARGE CRUSHERS
CLEAN UP · CLEAR LAND
PUSH · HAUL · LIFT

TRAXCAVATORS ARE PROFIT-MAKERS

A 3332-1P-C

ATLAS MANASITE DETONATORS



Again, History Repeats Itself

WHEN hydraulic brakes were introduced as a forward step in automobile construction, they were called impractical, unsafe—undependable. Controversy raged. But trial in service—on every type of car, under every conceivable driving condition—proved their worth. Today, hydraulic brakes are standard equipment and taken for granted by the motoring public.

Years ago, Atlas began experiments with the use of hexanitromannite in blasting caps—a chemical less sensitive to impact and friction. As a result, three years ago came the commercial introduction of Atlas Manasite detonators with an increased margin of safety. Followed the inevitable question—are they dependable? History gives the answer: over 100,000,000 Atlas Manasite detonators already have been used . . . over 1¾ million on the Delaware Aqueduct alone!

Your Atlas representative will be glad to give you full details.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

How to cut rope costs . . .

ROEBLING

"BLUE CENTER"

WIRE ROPE

PREFORMED OR STANDARD

Through years of planned research and development, we have continually improved the endurance of Roebling "Blue Center" Wire Rope. Today, as a result, "Blue Center"—Roebling's highest achievement in wire rope manufacture—enables you to keep your wire rope replacements at an all-time "low".

There are other important reasons for the long life and economy of "Blue Center". For example—Roebling's control of every manufacturing process from raw material to final inspection, and exceptional testing facilities.

Companies that keep accurate records report that Roebling "Blue Center" gives them lowest rope replacement cost. Therefore, we say with assurance—put Roebling "Blue Center" to the severest test—on any of your rope-rigged equipment. We are confident of the results!

CLOSE CONTROL OF WIRE ROPE QUALITY

When it comes to making Roebling "Blue Center"—a wire rope of exceptionally great strength and stamina—ordinary production methods won't do. Painstaking care and skill of the highest order must be exercised.

Typical of this care is the close control of quality in making Roebling "Blue Center" Wire Rope—control from steel production to finished product.

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Trenton, N.J.

Branches in Principal Cities

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New York, N.Y., U.S.A.

Cable Address: "Roebling's"
New York

ROEBLING 1931 150TH ANNIVERSARY

JOHN A. ROEBLING'S SONS COMPANY

WE BROKE WITH TRADITION...

TRI CLAD INDUCTION MOTOR

Gives extra protection 3 ways

1 *Extra Protection*

AGAINST PHYSICAL DAMAGE

One-piece cast-iron frame and cast-iron end shields protect the vital parts — from external blows, falling objects, or dripping liquids—keep them safe and secure even under slam-bang conditions. The entire stator frame, including integrally cast feet, is built to give all-round strength without excess weight.

BUILT FOR PROTECTION FIRST . . . TO LAST

...TO BUILD THIS NEW MOTOR

2 *Extra Protection*

AGAINST ELECTRICAL BREAKDOWN

Stator winding of Formex* wire—the toughest magnet wire ever developed—gives extra protection against moisture, oil, abrasion, and heat-aging. New synthetic-resin bonding varnish and Glyptal No. 1201 Red on end windings make a sturdy unit with a durable finish. You get a motor you can count on for continuous service year after year.

*Reg. U.S. Pat. Off.

3 *Extra Protection*

AGAINST OPERATING WEAR AND TEAR

Sleeve bearings are of new design—have a scientifically determined length and diameter and a method of grooving that assures a continuous oil film over the entire bearing surface. A new and simple ball-bearing mounting assures correct alignment and exclusion of foreign materials—bearings can be cleaned and greased without disassembling.

OUR field studies had shown that, more and more, the requirements of industry were demanding a vastly improved general-purpose motor, and it was apparent that this demanded a radically new approach on the part of the designer. Similarly, design studies showed that only by making a fresh start could full advantage be taken of the materials and methods that were newly available. Only by matching up *all* the new wants and *all* the new ways of doing things, in a supreme effort to make a *long jump* ahead—instead of the traditional *step* ahead—was it possible to achieve the truly modern motor you asked for.

And now you have the Tri-Clad motor—a completely new design. More than 15 important improvements have been built into it. And for the reason that so many major improvements were concentrated in one design, we had to have just that much more assurance that each one was thoroughly practical. Never before, we believe, has the manufacturer required a motor to prove itself so thoroughly in advance of initial sale.

Whatever the task you have for a general-purpose motor—whatever your special concern for appearance, convenience, quietness, *or* protection—you will find that the performance-tested features of the Tri-Clad motor will give you specific benefits on the job. General Electric, Schenectady, N. Y.

Integral-hp sizes up to 20 hp (at 3600 rpm), open and splashproof, are now available. Also capacitor motors up to 5 hp (at 3600 rpm).

GENERAL ELECTRIC

750-37

THIS SMART OPERATOR SELLS 100% OF HIS PRODUCT

— because his plant can now supply smaller sizes of crushed stone demanded by changing specifications

TELSMITH
Intercone Crusher

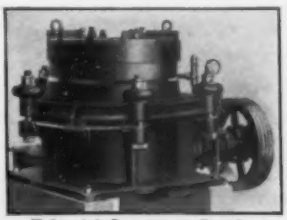
The Crystal Lake Crushed Stone Co., Sheboygan, Wis., found that 20% to 30% of their product went to the stockpile instead of to market. The reason? Changes in specifications had created a market demand for smaller-sized stone. There was little demand for these coarser sizes.

Early in July, 1940, a Telsmith Intercone Crusher was installed. They're selling 100% of their product now. The Intercone is crushing down to the sizes the market uses. It has increased by 50% the plant's capacity for plus ⅜" to minus ⅜" stone chips. The product is finer and better, too. The output of torpedo sand is increased, and its quality improved on account of its larger content of stone particles.

The Intercone has operated on an average of 8 hours daily, crushing minus 1½" to plus ⅛" Wisconsin moraine gravel. Discharge is set at plus ⅜"; capacity feed, 10 yds. per hr. A 20-hp. motor powers the Intercone. There has been no oil loss; no maintenance. Operating costs here, as everywhere, have been surprisingly low.

In your plant a Telsmith Intercone will *make* money and *save* money for you. And you can buy it at a price—*the lowest for any reduction crusher of equal size.* Get the details in Bulletin IC-11.

In this plant *other Telsmith equipment includes:* Rotary Feeder, 8-A Primary Breaker, 40" x 14' Hercules Gravel Washer, 34' No. 5 Belt Elevator, 28" x 12' Screw Rewasher, 2' x 6' Single Deck Pulsator, 16" x 22' Conveyor.



Telsmith Intercone Crusher

SMITH ENGINEERING WORKS, 104 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

IC-4

50 Church St. New York City
211 W. Wacker Drive Chicago, Ill.
713 Commercial Trust Bldg. Philadelphia, Pa.
81 Binney St. Cambridge, Mass.
Vern Wheeler Eqpt. Co. Columbus, Ohio
Brandeis M. & S. Co. Louisville, Ky.
Charleston Trac. & Eqpt. Corp. Charleston W. Va.
Roanoke Trac. & Eqpt. Co. Roanoke, Va.
North Carolina Equip. Co. Raleigh and Statesville, N. C.
Wilson-Wesener-Wilkinson Co. Knoxville and Nashville, Tenn.
United Steel Sales Toronto, Ont.

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

●

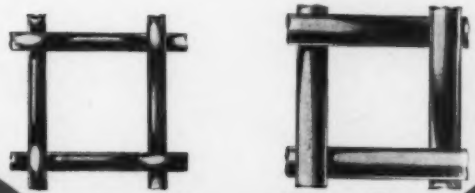
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—

endure vibration better—

resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY SAINT LOUIS

STURTEVANT

Before Buying an AIR SEPARATOR *be sure you know all about the* STURTEVANT

The installation of the first STURTEVANT AIR SEPARATOR revolutionized separation practice in the cement industry. Since then over 284 have been sold on approval and not a single rejection. This is more than adequate proof of their superiority.

STURTEVANT AIR SEPARATORS not only produce fine products in ranges of from 40 to 350 mesh but they do much more. They operate continuously without shut downs and subsequent loss of labor-time and output.—They attain high capacities at low cost per ton for power and upkeep.—In short they have revolutionized pulverizing technique.

★ ★

Hundreds used for Limestone, Lime, Gypsum, Clay, Refractories, Talc, Soapstone, Coal, Coke, Phosphates, Abrasives, etc., etc.

STURTEVANT FEATURES

- Lower Temperatures
- Specific Surface Area
- Particle Size Control
- Quality Cements
- Lower Production Costs
- Increased Tonnage
- Increased Mill Capacities
- Separation to any fineness from 40 mesh to Micron sizes

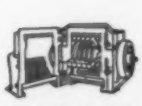
Jaw Crushers

Rotary Fine Crushers

Crushing Rolls

Ring-Roll Mills

Moto-Vibro Screens


Swing-Sledge Mills

STURTEVANT MILL CO. HARRISON SQUARE BOSTON, MASS.

4 Significant Jobs

Job No. 2—Helen, Ga.

Job No. 4—Kansas City, Mo.

Job No. 1
Lawrenceburg, Ky.
Not shown here.

Job No. 3—Aurora, W. Va.

IN 1940 Barber-Greene Mixers were set up for the "high type hot mixes" on four widely separated locations. They herald a new era in bituminous construction. The performance data and laboratory reports have been assembled into a booklet, available on request. Not a picture book, it gives the *results* of applying the modern production principle of continuous flow to the "high type hot mixes". It will answer the questions of those who are *sincerely skeptical.*

The B-G Central Plant includes the Dryer, Gradation Control Unit (Screen, Bins, Apron Feeder, and Calibrated Gates), and Mixer. It gives the finest means of preparing the "high type hot mixes". By "finest" we mean from every angle, including accuracy, consistency, ease of inspection, high capacity, portability, versatility, and economy.

The units can be used in any desired combination, including Single Aggregate Central Set-ups, and Travel Plant work.

It will not be surprising if the introduction of the continuous plant on "all type" mixes is opposed — by some wanting only complete proof and demonstration — by others who have financial or other interests in less portable, less versatile, or less modern equipment. We conscientiously believe that these groups will serve their own interests by studying the booklet. Already some producers have expressed interest in supplementing their present permanent equipment with a portable continuous plant, in order to more economically supply the more distant areas of their present markets.

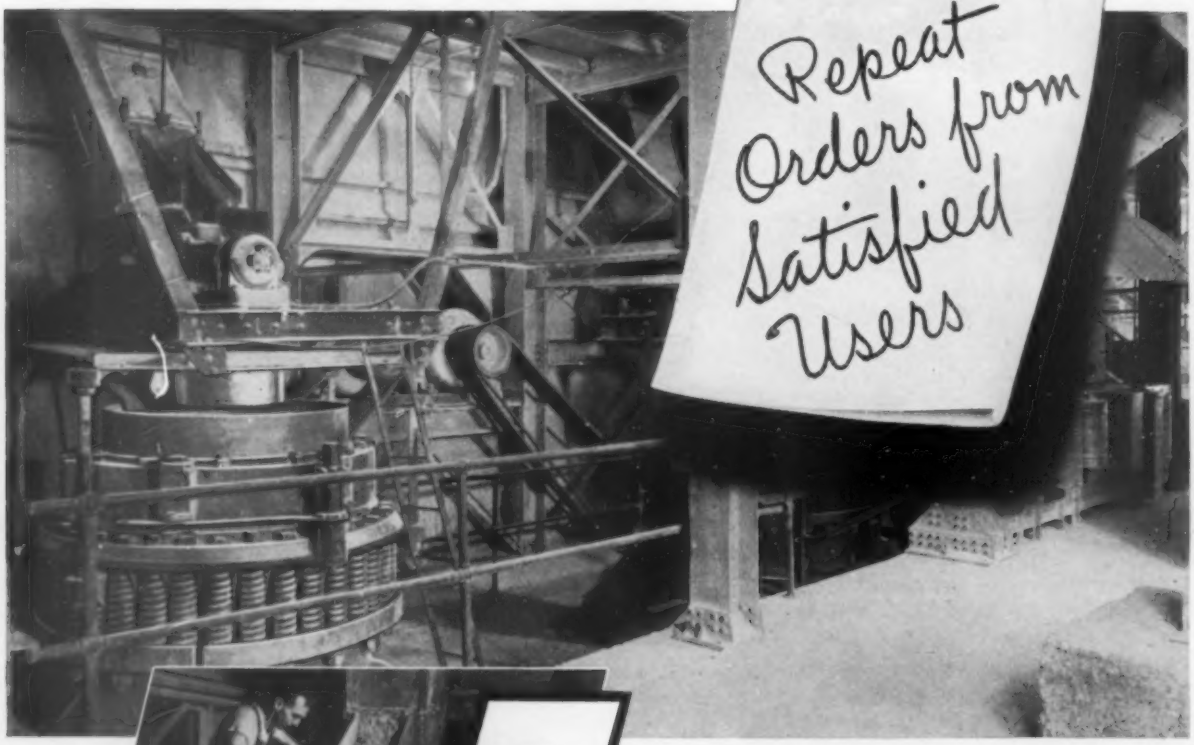
Write for your copy.

1-41

BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS



7 SYMONS CONE CRUSHERS . . .

Serve this Stone Producer!

Repeat orders are common among users of Symons Cone Crushers. Basic Dolomite, Inc., is one of the many larger producers who has continued to order Cones because of the satisfactory performance given by the original installation. The seven machines used by this company, which take care of the fine crushing operations, include both Standard and Short Head Types and range in size from 20 to 48 inches. Another prominent producer of aggregate has twenty-seven Symons Cones in service. It is the installation of this modern reduction crusher that has enabled many plants to maintain production in face of changing material specifications and at a crushing cost which assures of increased profits.

If your operating problem is that of finer crushing in quantity, investigate the merits of the Symons Cone.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

NEW YORK CITY 60 E. 42 St. | LOS ANGELES Subway Terminal Bldg. | TORONTO Concourse Bldg. | LONDON Bush House

SYMONS CONE CRUSHERS

"We've proved the **Greater value** *of* **GULF QUALITY LUBRICANTS** *on this crusher"*

—says this Foreman

(Below) Actual photo of a Gulf Engineer discussing crusher lubrication with foreman in underground iron ore mine. This unit breaks high silica rock and ore in sizes up to 30 x 42 in.

"We get improved lubrication practice by following the Gulf Engineer's recommendations"

"WE get highly dependable service from this crusher—day in and day out—under extremely severe operating conditions," says this foreman. "We've proved that it pays to use Gulf quality lubricants for our equipment."

The higher quality lubricants and advanced application methods recommended by Gulf engineers are helping many mine and quarry operators get maximum output from their equipment by reducing failures and delays. Are you looking for a means of getting top performance every day in the year from your equipment? Ask a Gulf engineer to give you his suggestions for its proper lubrication. You can benefit from his thorough training and broad experience with equipment like yours.

The Gulf line of 400 quality oils and greases is quickly available to you through more than 1200 warehouses in 30 states from Maine to New Mexico. Write or phone your nearest Gulf office today.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.

ALLIS-CHALMERS

THE

Ripl-Flo Costs You Less Than Any Screen With Comparable Performance on the Market Today!

THE NEW ALLIS-CHALMERS RIPL-FLO SCREEN'S smoother operation means increased efficiency . . . reduced power and maintenance costs for you. Best of all, you get this up-to-the-minute screen at a cost that's less than you pay for any screen of comparable performance on the market today!

Let ALLIS-CHALMERS COOPERATIVE

ANNOUNCES RIPL-FLO

A REMARKABLE NEW VIBRATING SCREEN THAT CAN CUT YOUR SCREENING COSTS!

1. INCREASED EFFICIENCY! The Ripl-Flo's new principle of circle throw does more than just shake the material. It *rolls* it over and over . . . practically eliminating blinding . . . really steps up your screening efficiency!

2. SMOOTHER OPERATION! "Like water flowing over a riffle!" said one operator after watching the Ripl-Flo in action. Because of the dynamically balanced mechanism, you get a screen that's *smooth* starting . . . *smooth* running . . . *smooth* stopping!

3. REDUCED POWER CONSUMPTION! By a unique means of balancing, Allis-Chalmers screening specialists *slashed* the Ripl-Flo's power requirements to about 60% of other screens of similar capacity. You save 40 cents of every power dollar . . . and still get four-bearing performance!

4. QUICK, EASY INSTALLATION! It's easy to install the new Ripl-Flo . . . with either cable suspension or floor mounting! Rugged springs prevent transmittal of vibration. Built-in discharge spouts give you a neater, less expensive installation. And a second deck can be added in the field if you want an additional product size.

5. LOWER MAINTENANCE COSTS! Your maintenance costs with the Ripl-Flo are remarkably low . . . thanks to Allis-Chalmers cooperative engineering! Transverse crowning of the cloth assures even tension . . . cuts deterioration. All welds are stress relieved through annealing. In fact, every part is designed to give you long years of trouble-free service.

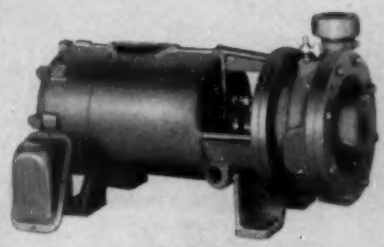
6. INITIAL COST LESS! Because all superfluous parts have been left off, you get the new Ripl-Flo Screen . . . with all its engineering advancements . . . *at a cost that's actually less* than you pay for any comparable screen on the market today!

Remember, whether it's screening . . . or any other problem that may arise in your daily operations, call in an Allis-Chalmers specialist in the district office near you. Working with your own engineers . . . backed up by Allis-Chalmers cooperative engineering . . . he'll help you get the *right* machine for the job you want done.

ENGINEERING *Cut your costs*

News of other Allis-Chalmers Products that cut your costs!

THE NEW, LARGER SIZE NO. 636 Type "R" Crusher developed to give more plants a better product . . . easier . . . at lower cost. Here a No. 636 . . . with "Speed-Set" product control . . . is installed in a Texas plant.



ALL-IN-ONE PUMP—THE ALLIS-Chalmers Electrifugal—with extra value features at no extra cost . . . delivers more gallons of water per power dollar.

DRIVING A CONVEYOR IN AN Indiana plant, this Allis-Chalmers Lo-Maintenance Motor handled 4,000,000 tons of material in five years . . . without one cent for repairs.

A-1386

EVERYTHING IN STEEL

Ryerson carries the largest and most complete steel stocks in America . . . carbon steels, alloys, stainless, etc., in every size, shape and form . . . a ready, reliable source of supply.

CERTIFIED QUALITY

Ryerson Certified uniform high quality Steels meet exacting, narrow range specifications . . . an important advantage—especially with alloy steels where chemical content, heat-treating response and other characteristics must be known with certainty to assure best results in less time.

IMMEDIATE SHIPMENT

Fast delivery is assured from ten conveniently located Ryerson plants . . . no order too small for prompt, personal attention or too large for immediate shipment.

RYERSON CERTIFIED STEELS

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Buffalo, Cleveland, Boston, Philadelphia, Jersey City.

RYERSON

PROGRESS MADE IN SOCIAL JUSTICE

BACK IN THE DAYS at the depth of the 1930's depression, when NRA was operating full blast, and the attempt was being made to establish minimum wages in industry, we overworked our pen in an attempt to show that a guaranteed yearly wage or income was more to be desired than a minimum hourly wage scale. Obviously, the man who works for a living is more concerned that his yearly income meet his needs, than that his hourly wage is high or low, if he has no idea how many hours in the year he can earn it.

Many were the discussions of this subject with leaders in these industries. Almost invariably the discussion ended in the concession that a guaranteed monthly or yearly wage was *the just thing;* the solution of one of society's pressing problems. But, for seasonal industries like this, absolutely unattainable! One man particularly gave this problem much serious thought and felt keenly the social justice angle. He was the late Charles M. Cadman, of San Francisco, whose memory all who knew him hold in reverence.

Charley Cadman's brother, Dr. Cadman, is one of the country's outstanding economists (now economist of the National Association of Manufacturers); and Charley Cadman once revealed to the editor that this brother had told him the problem *could be* licked; and Charley was baffled because he as an employer could not solve it. Had he lived to attend the convention of the National Sand and Gravel Association at Cincinnati, Ohio, this last January, Charley Cadman would have listened with keen sympathy and appreciation to the experiences of producers like himself, who now are beginning to find solutions.

To us, this was the most interesting and most significant subject discussed at Cincinnati. How impossible of accomplishment seemed many of the objectives set up in the first throes of New Deal reform? However, don't misinterpret us, here, for we don't believe the New Deal administration had any more to do with actually solving this problem than we had. It did furnish the incentive. American employers themselves, in spite of handicaps and obstructions, in sympathetic understanding of a highly desirable goal, are finding the solution, or rather a variety of solutions, each best adapted to their own operations. Nevertheless, the guaranteed monthly and in some cases yearly wage has come to pass in the operations of some progressive producers; and in all probability eventually will become universal in well established, going concerns.

Having attained in a few years that much of social gain, let's see if there are not other objectives, apparently unattainable, which by use of the same American ingenuity and grey matter can be attained. One of these is surely a better understanding and a more coöperative attitude between employers and employees. The guaranteed wage has already proved a great step in that direction. Employers are finding that employees are much more reasonable in wage demands when wages in terms of monthly or yearly income are under consideration. Even labor union agents in collective bargaining negotiations are more amenable. We were surprised and gladdened to hear employers say that, in their opinion, there seemed to be a rising tide of intelligence and capacity in union labor leaders.

All this is as it should be if this country is going to have to face a hostile world of autocracies and remain a republic of free men. Fortunately, we enter the struggle without deep-rooted class distinctions, from which all the other great democracies of the world have had to suffer, and sooner or later must atone for. If there is any privileged class in this country, it is composed of those whose privileges consist chiefly of voluntarily carrying more and heavier responsibilities than their less (?) fortunate brothers.

The great majority of mankind does not love responsibility over and above that called for in an humble job. Every employer knows this, and most employees are honest enough to admit it. Nevertheless, the humble ones expect to be and should be treated as human beings; with all fairness and consideration. Too many employers are apt to look with more or less ill-concealed contempt upon other men who, in their opinion, haven't the ambition to seek positions of responsibility. That's a mistake, a managerial mistake as well as a moral one, for men are differently constituted. A man who has not that instinct of acquisitiveness necessary to accumulate riches (and responsibilities) usually has no greater respect for one who does have it, than the "big shot" has for him.

If the big shot, the employer, fully understood and appreciated this philosophy of the so-called underdog; that sincere respect for any one is acquired not by rank or riches, but by the human qualities of heart and mind, there would be fewer "labor troubles" and more and better coöperation between employers and employees. We doubt that self-respecting American workmen desire to become the "wage slaves" of politicians, either those on the public payroll or those on their own union payrolls, any more than they want to be wage slaves of "soulless corporations."

Nathan C. Rockwood

NEWS AND COMMENT

Mild Dun

ONE OF THE small associations in our industries, struggling always to keep alive, in announcing its annual convention, put in this, the mildest of any dun for dues, we have run across:

"In addition to the above question for discussion is the question of finances to maintain our Association, and our Association activities. If you have not paid your dues for 1940, it would be a nice gesture to those who have paid, if you will pay yours."

More than a mere gesture, we would say.

Labor Can't Conspire?

READERS OF ROCK PRODUCTS in 1940 will recall a news item in the April issue p. 66 which told of an investigation of the construction materials industry in Chicago, Ill., to find out why ready-mixed concrete was shut out. Subsequently local labor leaders were indicted by a federal grand jury for conspiring to prevent the use of ready-mixed concrete on city jobs. The principal defendant, Mike Carrozzo, has since died, but the other 11 defendants apparently will not be brought to trial.

On February 1, Federal Judge Sullivan at Chicago sustained a demurrer to the indictment. He said in part:

"The indictment alleges and the government contends that the use of truck mixers would result in a saving of labor costs through reduction of the number of men employed. Defendants insist that this is exactly what they are objecting to, and the purpose of strikes or threatened strikes was to compel cement contractors in the Chicago area to accede to the union's demands that the services of engineers be retained on jobs where truck mixers were used; that these activities are within the legitimate objects of a labor union.

"There appears to be nothing unreasonable in these demands, and only lawful means seem to have been used in accomplishing them. I am of the opinion that defendants under such circumstances are immune from prosecution under the Sherman act, by reason of the provisions of the Norris-La Guardia act, which enlarges the scope of section 20 of the Clayton act."

Special Assistant U. S. Attorney, Leo F. Tierney, who was prosecuting the defendants, is quoted as saying he would appeal to the United States Supreme Court.

"Judge Sullivan's decision is clear cut," he said, "and will present a definite issue for the decision of the Supreme Court. As I read the opinion, Judge Sullivan holds that the Norris-La Guardia act by implication strips the courts of jurisdiction in criminal cases involving labor. Should this be the law, a labor organization can control interstate commerce by restricting the sale and shipment of all machinery or devices which displace labor."

Strikes Unpopular

BILLS have been presented to the present legislators of Illinois and Indiana (and possibly other states) which would prohibit strikes in national defense industries. They probably will not be passed, but they are additional evidence of the growing public distaste for strikes instituted solely to force union recognition, or force closed-shop contracts on employers.

Since workers in the national defense industries are said to be only 30 to 40 percent unionized, and the federal government is at least half-heartedly attempting to compel collective bargaining, as a part of national defense contracts, we can expect aggressive campaigns to organize all labor in these defense industries. Most employers are anticipating more labor troubles rather than less. The most hopeful solution is in voluntary mediation, which according to a recent survey by the Twentieth Century Fund is successful in about 90 percent of the cases where it is followed.

Larger Bins Required for New Cements

THE EDITOR: From our contacts with equipment engineers and field men who service the construction industry, we learn that the growing use of certain finely ground and some special cements adversely affects the capacity ratings of bulk cement bins and bulk cement elevators. Editorial attention to the subject at this time may serve to prevent misunderstanding and may assure that contractors, when they know beforehand that they are going to handle special cements, will protect themselves by the purchase of adequate bin and elevator capacity.

Bin capacity and elevator ratings are based on standard portland cement, weighing 94 lb. per cu. ft. Allowance is made in these capacity ratings for some fluffing, but there is not sufficient allowance to cover the finer ground cements or conditions where the cement due to manner of handling is fluffed to an abnormal extent. In other words, the capacity ratings are based on a standard range of compaction of the cement.

However, the cement may be aerated, or because of its nature or method of handling may weigh much less than 94 lb. per cu. ft. Certain cement in the loose condition may weigh as little as 60 lb. per cu. ft. High early strength cements are an example: they are more finely ground and will fluff much more than standard portland. Naturally, when a cement is fluffed, it occupies more space per pound (or per barrel).

An example is cited from a recent Pittsburgh installation. This dealer has a three-compartment bulk cement bin at one of his yards and when he fills them with standard portland cement, he can place 355 bbl. in each compartment. When he uses high early strength cement, he gets only 300 bbl., an immediate shrinkage of 15 percent in the capacity of bin and elevator. This installation is equipped with a 50-ton-per-hour elevator, but under the conditions cited the elevator rating drops to 42½ tons per hour with the high early strength cement. Expressed in another way, the high early strength cement in this case

weighed only 79.9 lb. per cu. ft.

In another case, in Texas, a contractor complained that the elevators of a two-plant installation were not delivering the rated 30-tons-per-hour. Engineers from one of the equipment companies* happened to be at the site and their investigation revealed that the particular kind of "standard cement" being used at this point was fluffing considerably, so much so that it weighed about 66 lb. per cu. ft. It was reported further that practically all of the cement now being furnished by Texas mills is ground very fine and this contributes to the fluffing of the cement and its light weight.

Contractors should take these conditions into account when planning installations of bins and conveyors for bulk cement.

It is not the intention of this communication to reflect on cement quality, nor to "plug" for certain types of cement, nor to associate the problem with any specific make of equipment. We believe the situation interests all producers and users of bulk cement bins and bulk cement elevators—and is therefore of general importance to the construction industry.

M. K. MELLOTT & CO.,
By Andrew M. Pitney,
Pittsburgh, Penn.

Million-Yard-a-Month Electric Shovel

ONLY ONE OR TWO quarry operations that we know of could use a 35-cu. yd. electric shovel, but probably the following will satisfy the curiosity of every shovel operator. Describing 1940 developments in strip coap mining in the February issue of *Mining and Metallurgy*, K. R. Bixby, chairman of the Open Pit Mining Methods Committee of the American Institute of Mining Engineers, has this to say:

"The Tecumseh Coal Corp.'s plant in southern Indiana got into actual production in 1940. It was at this plant that the new 5561 Marion electric 35-cu. yd. 'knee-action' stripping unit was introduced. In this revolutionary shovel, the crowding mechanism is entirely removed from the boom structure and mounted on the gantry frame, thus leaving the boom only as a compression member carrying the point sheaves. The 'knee-action' feature also gives a greater cleanup radius, and this permits the filling of the large-size dipper even in light overburden. Similar 'knee-action' construction was incorporated in the coal-loading shovel. As a result, the coal operator's dreams of a 1,000,000-cu. yd.-per-month stripping unit and a 1000-ton-per-hour coal-loading machine are the realities of today."

*The engineers who investigated this case did not represent the company who supplied the elevators and bin equipment.

T.V.A. Labor Contracts

HENRY FORD may be deprived of national defense contracts because he will not submit to closed-shop union contracts, but the United States Government itself does not accept them. Last summer an agreement was signed by the Tennessee Valley Authority and the Tennessee Valley Trades and Labor Council. The labor council is made up of 15 unions representing the painters, boilermakers, blacksmiths, machinists, electrical workers, building and common laborers, operating engineers, sheet metal workers, lathers, cement finishers, plumbers and steam-fitters, carpenters, bricklayers, masons and plasterers, teamsters and asbestos workers.

The agreement, according to *Engineering News-Record*, is an extension of the labor policy adopted by the TVA in 1935, which policy is made a part of the new agreement. The 1935 policy statement related chiefly to collective bargaining, pay and working conditions; it had no provision for settlement of strikes. The new agreement attempts to eliminate strikes by the following provision:

> The public interest in an undertaking such as the TVA always being paramount, the authority and the Tennessee Valley Trades and Labor Council on behalf of the employees further agree that pending the determination or adjustment of any issue arising between them by means of the conference machinery and procedures hereby set up and during the life of this agreement, the authority will not change the conditions incorporated in written schedules or recorded understandings between the authority and the council out of which the issue arose, and the council or its member organizations will not encourage or sanction employees leaving the service.

The new agreement does not set up a closed shop. By incorporating the 1935 labor policy statement it guarantees employes against discrimination due to membership or non-membership in any organization.

Golden Anniversary

CALIFORNIA PORTLAND CEMENT CO., Colton, Calif., is celebrating this year its 50th anniversary. We know because we are the recipient of an attractive blue and gold calendar. On the bottom is "Fifty years building the Southwest." Congratulations!

Sermon in a Nutshell

SOME of those who attended the directors' meeting of the National Sand and Gravel Association in Dallas, Tex., two or three years ago had an opportunity to meet the Honorable Hatton W. Sumners, member of the United States House of Representatives. Those who did meet Congressman Sumners got some idea of why our Texas sand and gravel friends regard him so highly. Recently he addressed the American Standards Association, and among the excellent advice he gave industry were these extracts:

"Much of what the government is now doing is being done because the people did not do for themselves what needed doing at the time when it should have been done. Nature does not permit power to remain where it is not used. When the people have an opportunity to do a thing, and do not take it, the opportunity departs, and the government takes over.

"Our Constitution was not given to us through the divine inspiration of the men who gathered in Philadelphia to write it. They did not write it in a creative sense. It evolved from the struggles of the people through centuries of experiment and adaptation. Right now we have the ability to produce everything we need—food, clothing, houses, money, and machinery—but we are not certain that we can preserve these against the forces within our own economic set-up which may destroy them. We have no foreign foe in America, and have had none for 100 years, but we are facing a grave danger. That danger is a weakening of both our economic and our governmental democracy. I believe we must work to preserve our democracy of opportunity as well as our democracy in government. Something the great captains of industry should begin to understand is that Democracy cannot be preserved by economic feudalism.

"If you bring back this equality of business opportunity, then there will not have to be so much governmental supervision and regulation. If you cannot, then I can see nothing but for the big organizations to grow bigger and bigger, and for more federal bureaus to regulate them, the whole system taking from private property the attractive elements of ownership."

Hints and Helps

★ FOR SUPERINTENDENTS ★

Crushing Boulders Rejected by Grizzley

ARUNDEL CORP., Baltimore, Md., in designing a new sand and gravel plant, adopted a scheme for separating out and classifying sand before conveying gravel and sand to a stockpiling tipple.

To do this, the scalping screen and sand equipment were installed below

Crusher mounted on ground level so that boulders may be dumped by hand as they are rejected by adjacent scalping screen

ground level, with trucks dumping pit run material on to 6-in. spaced grate bars over a hopper feeding a revolving scalping screen. Oversize gravel (plus 2 in.) is elevated to a jaw crusher in circuit with the screen. An incidental benefit of this design is that the crusher is mounted on the ground level adjacent to the grate bars as shown. Boulders rejected by the grizzley are merely dropped into the crusher, with very little effort on the part of workmen, as contrasted to the usual custom of sledging or discarding them completely.

Computing Length Of Cross Belt

W. F. SCHAPHORST

Most of the formulas that one finds for computing the length of cross belts are rather complex, involving the use of an angle, and the sine or tangent of that angle, making the handling of the formula very difficult for most of us and requiring the use of a handbook or table, etc.

Below is a formula that I recently developed which avoids the angle entirely and which gives surprisingly close results for most combinations of cross drives. The formula is:

$$x = \pi(R+r) + 2\,(R+r)^2 + \frac{}{L}$$

$$2\sqrt{L^2 - (R^2+r)^2}$$

Where

x=Length of cross belt in inches;
R=Radius of large pulley in inches;
r=Radius of small pulley in inches;
L=Distance between shaft centers in inches.

For sake of comparison, if you want to compare and if you know how to use trigonometry, here is the "rational formula" which gives exact results:

$x = (R+r)\ (\pi+.0349A) + 2L \cos A$

Where A=angle whose sine is $\frac{R+r}{L}$

For example: If R=10 in.; r=5 in.; and L=100 in. What is the length of the crossed belt?

Answer: Applying "my" formula I get 249.1 in. Applying the "exact" formula I get 249.3 in. In other words, the difference is less than a quarter of an inch.

Cleaning Raw Dust Silos With Air

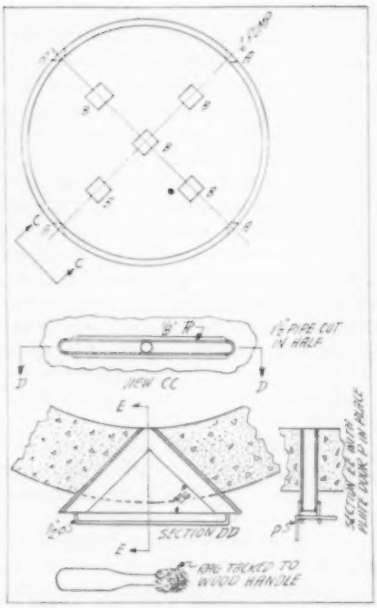
By V. K. NEWCOMER
Supt., Juan Minetti E Hijos, Ltd.
Campo Santo, Argentina, S. A.

EXPERIENCE has shown that it pays to clean the raw dust silos periodically, but it was always a headache from the points of view of cost, loss of storage space, and safety.

We finally evolved the system shown in the sketch, and with the aid of compressed air a surprising amount of the dust can be sent to the Fuller pumps.

The openings, made of 1½-in. pipe cut in half and covered with ⅛-in. plates, were welded to the reinforcing rods of the silo and then grouted in place. On a piece of ¾-in. pipe is marked the radius of the silo and the distance from the outside of silo to the center of the four outside draw holes. To operate to the best advantage, it was found that the pipe should be forced to the center of the silo before the air was turned on.

The pipe is moved back and forth between the two draw holes which are in line. To remove the dust between the draw hole and the wall, we work from the holes to the wall



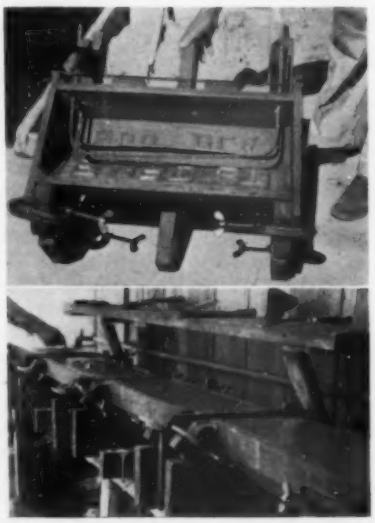
Showing arrangement for cleaning raw dust silos with air

and not from the wall to the holes. A curved pipe is used last.

Forms for Making Concrete Street Markers

By JOS. C. COYLE

COLLAPSIBLE WOODEN FORMS of ¾-in. lumber, set up in rows on waist high benches makes the manufacture of concrete markers for street corners or graves easy. They may be used indefinitely if cleaned and oiled each time. By the use of selected aggregates of high color, or glitter, an attractive surface may be produced, or a similar result achieved by painting. Sunken letters, numbers, or



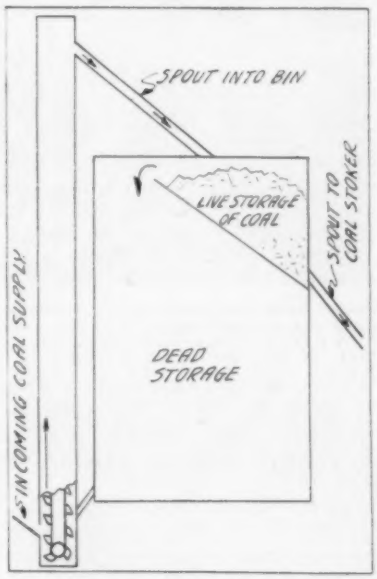
Above: Street marker form with lead numbers and letters nailed in place. Below: Casting four concrete markers at a time

scrolls, etc., may be made by attaching lead forms, with small finishing nails, to the face forms. Three cornered molding, nailed at the ends will form beveled corners.

In the type shown, herewith, the face of the 6- x 11- x 24 in. concrete street markers slopes back to 2⅝-in. at the apex. They are cast face down, top toward the workman. One 6-in. cleated board with four holes near the corners for small rods, by which the markers will be secured to a fresh poured base, forms the marker bottom. A 7½-in. board, nailed to the 27-in. 2 x 4's forms the vertical part of face. Face slope and marker top are formed by two boards beveled on the edge and nailed to two 1½- x 3¾- x 9½-in. strips cut to fit the contour. The end forms are 8- x 16-in. hinged at the bottom to ¾- x 2-in. strips bolted outside the end stringers. A thin metal strip is screwed to the outside of the ends where the small tension rod fits into slots, and is threaded for thumb nuts. The front ends are tightened with C clamps, and tapered wooden wedges inserted beneath the end cleats of the face-top member. Thin end of wedge is notched in stringer; thick end on sloping block at end of stringers. Small cleats on the rigid face board, and on the end boards, back up the bottom form.

Preventing Spontaneous Combustion of Coal

A LARGE SILICA SAND company in the Middle West, in adding to the drying facilities at one of its plants installed a 250-hp. steam boiler to be fired by automatic stoker. Storage for about four cars of 2-in. minus run-of-mine coal was provided in a new Marietta stave concrete silo to feed coal automatically by gravity into the stoker.



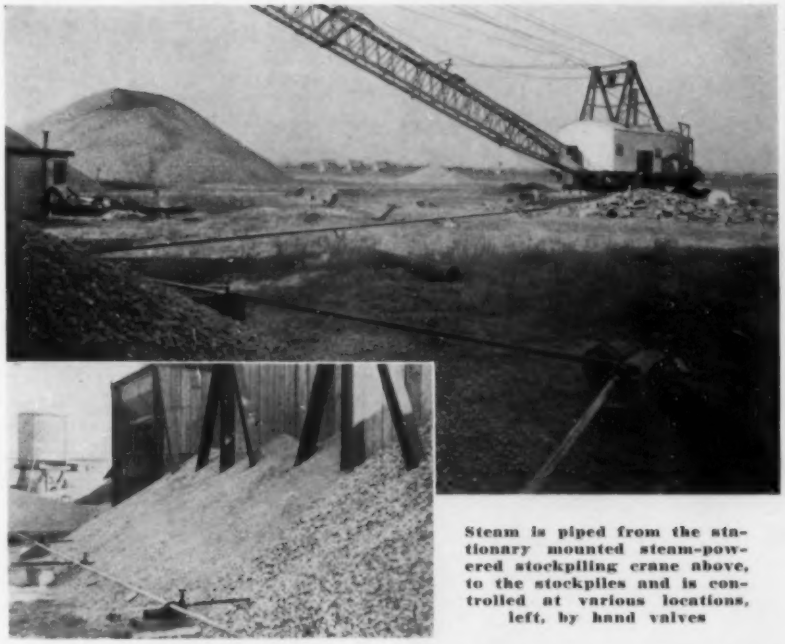
Elevation plan of coal storage arrangement to eliminate spontaneous combustion

To guard against spontaneous combustion, the bin was arranged as shown in the illustration. A shelf was built into the silo to separate about one-half carload of space above the shelf as a live storage area from which coal is fed out through a spout directly into the stoker.

In filling the silo, an elevator dumps the coal by a short spout into this space first. Additional tonnage overflows the shelf into the dead storage space. At the bottom of the silo, coal is withdrawn into the same elevator to replenish the "live" supply, rather than to allow this coal to stand too long in the silo under pressure from above. This arrangement permits circulating and re-handling the coal often to eliminate the spontaneous combustion hazard.

Heating Stockpiles With Steam

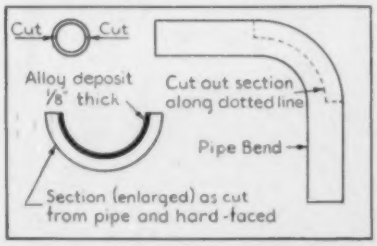
ARUNDEL CORP., Baltimore, Md., at its new plant, stocks sand and gravel in open top bins from which the aggregates are withdrawn by a tunnel belt conveyor to truck loading bins. The plant isn't designed for winter operation, but has provisions to release live steam under the stockpiles just over the drawoff gates in the event of freezing weather. Steam is piped under the storage piles, as shown in the illustration, direct from a stationary mounted steam-powered stockpiling crane with clamshell bucket which develops steam for its operation at 150 p.s.i. pressure. Note hand valves at the several points to release steam into the aggregates.



Steam is piped from the stationary mounted steam-powered stockpiling crane above, to the stockpiles and is controlled at various locations, left, by hand valves

Hard-Surfacing Pipe Bends

A METHOD of hard-facing the inside surface of pipe bends in air conveyor lines such as those used in cement mills was described in a recent issue of *Oxweld Tips*. The process consists of cutting out the outer half of the bend of pipe, applying a ⅛-in. deposit of Haynes Stellite No. 1 alloy to the inner face of the pipe, and welding the bend section back into place.



Method of applying a wearing surface to inner face of a pipe bend by welding the bend section back into place

It is suggested that the area to be hard-faced include the inner surface of the entire outer half of the bend and that it should extend lengthwise from one end of the curvature to the other as illustrated. The alloy is left as deposited and does not require any finishing, using an Oxweld W-17 blowpipe fitted with a No. 9 or No. 20 head depending upon the size of pipe.

Tough Specification For Big Aqueduct

By JAMES RAY NORTON*

THE ROSOFF Sand and Gravel Corporation of which Samuel R. Rosoff, a well known New York contractor, is the president, is not a new name in the industry. A large plant was operated for number of years at Marlboro, N. Y., on the Hudson River to supply a New York City market. During the past year a new plant was built, of which Mr. Rosoff is justly proud. It is located near Kerhonkson, N. Y., and has been built to process 800,000 cu. yd. of concrete aggregates to be used for lining the Rosoff section of the Delaware Aqueduct. The plant has an hourly capacity of 300 tons and embodies many features that are attracting the interest of large and small producers throughout the country.

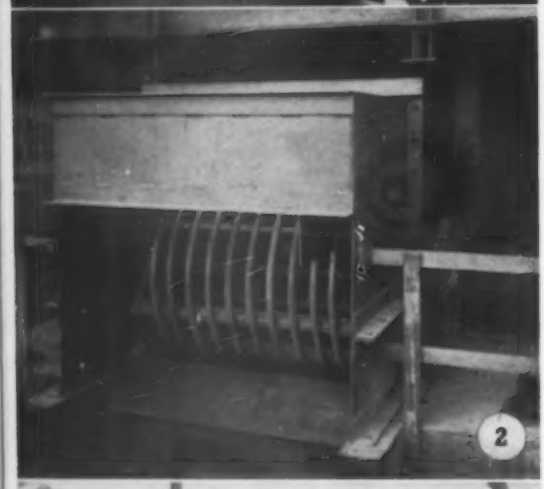
(A) 1½" to ¾" COARSE AGGREGATE	
Passing 1½-in. mesh	95—100%
Passing 1-in. mesh	30— 70%
Passing ¾-in. mesh	0— 8%
(B) ¾" to ¼" COARSE AGGREGATE	
Passing ¾-in. mesh	95—100%
Passing ½-in. mesh	40— 80%
Passing ⅜-in. mesh	10— 30%
Passing ¼-in. mesh	0— 7%
(C) SAND	
Passing ¼-in. mesh	100%
Passing No. 4 mesh	95—100%
Passing No. 8 mesh	85— 95%
Passing No. 16 mesh	40— 70%
Passing No. 30 mesh	20— 50%
Passing No. 50 mesh	12— 30%
Passing No. 100 mesh	0— 3%

The plant must produce a product that will meet the exacting requirements of the specification that has been set up by the New York City Board of Water Supply; 1½ in. and ¾ in. gravel and minus ¼ in. sand is required. All sand must be natural sand, which means that the sand must not contain crushed gravel. The gradations required by the Board are given in the accompanying table.

Before the plant was built, the deposit was prospected carefully. A series of test pits, about 200 ft. apart were excavated to a depth of 25 ft. The deposit is of glacial origin and contains a good quality of sand and gravel, ranging in size up to about 16-in. boulders. There is also a small and varying quantity of loam, clay and soft stone present throughout the pit. The gradation of the sand deposit is quite variable and requires that material fed to the plant be excavated simultaneously from different parts of the pit to meet the specifications of the finished product. As an average condition, it was determined that the total deposit contained about 60 percent sand and 40 percent gravel, and it was estimated that from 40 to 60 percent of the gravel would require crushing. The pit site was overgrown with small timber and required stripping to an average depth of about two feet.

View from secondary scalping screen platform showing main 36-in. feed conveyors and two 18-in. conveyors

As the test pits were excavated, a careful analysis of their contents was recorded by the company's engineers



From top to bottom: 1—Sand screen house with the two scrubbers and two gravel sizing screens shown below. 2—Rotary grizzly which distributes plus 4-in. gravel to primary gyratory crusher. 3—One of the 3- x 8-ft., double-deck gravel sizing screens. 4—Two 5- x 12-ft., triple-deck sand screens with central motor control panel in background

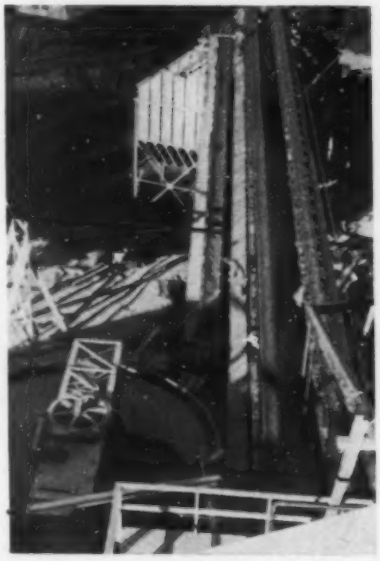
* James Ray Norton, New York representative, Smith Engineering Works, Milwaukee, Wis.

Processing 800,000 cu. yd. concrete aggregates for Delaware Aqueduct. Specifications require elimination of crusher grits from sand. Hydroseparator followed by classifier recovers fines and eliminates silt and micaceous material

View of hydroseparator and sand classifier taken just prior to initial operation

and the inspectors of the Board of Water Supply. This data and the requirements of the tunnel concreting schedule served as the basis for determining the specifications of the machinery for the plant.

The plant was designed by Rosoff engineers working in conjunction with



Hydroseparator and three finished product conveyors running to three-compartment storage bin

equipment engineers from the Smith Engineering Works, The Dorr Co., Inc., Blaw-Knox Co. and the General Electric Co. Plant construction drawings were prepared on the site by engineers from the Smith Engineering Works.

Utilize Gravity in Plant Design

By locating the plant on the side of an embankment, the top of the feed hopper is situated 115 ft. 6 in. above the level of the roadway beneath the storage bins. Thus the location afforded ample headroom for surge hoppers, provided a minimum length for the elevating belt conveyors, and made easy truck hauling grades at both the feed and delivery ends of the plant.

The main part of the plant is narrow since all of the machinery is located near the same centerline, except the closed circuit at the reduction crusher and the parallel dual washing and screening units. The total length from the feed hopper to the end of the storage bin is 386 ft. In the accompanying elevation drawing is shown the location of all of the plant units with the exception of the crusher grit bin and the grit dewatering screen that is mounted on it. Sequence of operations is shown in the flow sheet.

While the plant structure was being erected and the machinery set in place, the overburden on the deposit was removed with a Caterpillar bulldozer and an Osgood gas shovel. A No. 54-B Bucyrus-Erie Diesel-powered shovel excavated and built the embankments for five settling basins that cover approximately ten acres. These basins clarify the wash water so that it can be returned to the stream from which it is pumped.

Remove All Crushed Gravel from Natural Sand

Material excavated from the pit with the Osgood and the Bucyrus-Erie shovels is loaded on 8-cu. yd. dump trucks for transportation to the plant feed hopper. The finished products are trucked directly to ground storage at mixing plants which are located at the tunnel entrance shafts. The feed hopper, spanned with ten 100-lb. rails, acts as a grizzly and has 15-in. clear openings between rails. Any large boulders that may be retained are broken up with a hand sledge to pass the grizzly. A 36-in. x 6-ft. Telsmith reciprocating type plate feeder removes the pit run material from the feed hopper and delivers it to the rotary ring grizzly in a controlled, uniform-capacity feed.

The rotor of the No. 540 Telsmith rotary grizzly has ten 54-in. diameter rings made up of 2¼ in. diameter alloy steel rods with 4-in. clear openings between rings. It operates at a speed of 12 r.p.m., and distributes the plus 4-in. gravel to the No. 16-B Telsmith primary gyratory crusher. The minus 4-in. gravel and sand bypasses the crusher and unites with the minus 4-in. crusher product in a surge bin beneath the grizzly and crusher. A second feeder, identical to the first one, deposits the material from this surge hopper on the 36-in. belt conveyor where it is carried to the 5- x 12-ft. Telsmith scalping screen.

This scalping screen has two decks. The top one has 1½-in. openings and the lower one has ¾-in. openings. A flap gate at the discharge end of this screen can be set to collect all or a part of the plus ¾-in. gravel and direct its flow to the chute that carries the plus 1½-in. gravel to the Gyrasphere crusher. This is required in order to secure approximately equal proportions of ¾-in. and 1½-in. gravel in the finished product. The No. 36 Telsmith Gyrasphere reduction crusher has a 4½-in. receiving opening, and its discharge opening is readily adjustable to compensate for wear on the crushing surfaces and to produce a minus 1½-in. or minus ¾-in. product as required.

An 18-in. wide conveyor installed directly beneath the Gyrasphere carries the crusher product to a 3- x 10-ft. double-decked secondary scalping screen. The main function of this screen is to remove the minus ¼-in. crusher grits that are not permitted in the finished sand product. This screen has a ¾-in. top deck which serves to relieve the load on the ¼-in. lower deck and assures more efficient screening and longer life for the ¼-in. screen. Water used on this screen is collected with the minus ¼-in. grits and flows by gravity through an 8-in. dia. steel pipe to the crusher grit bin. The gravel that passes the ¾-in. top deck and is retained on the ¼-in.

Crusher grit dewatering screen and grit bin

lower deck passes to an 18-in. wide conveyor belt which transfers it to the hopper beneath the 5-x12-ft. scalping screen. Plus ¾-in. gravel is chuted to the lower end of the 36-in. conveyor.

Water is added to the minus 1½-in. (or minus ¾-in.) product after it leaves the 5- x 12-ft. scalping screen, and the total product is then divided and chuted to the two 5- x 12-ft. Telsmith triple-deck vibrating screens. These two screens remove the sand and water flumed to the Dorr hydroseparator. Gravel goes to the Telsmith Super-scrubbers. The bottom deck of the screen is equipped with an 8-mesh screen, the middle deck with ¼-in. screen, and the top deck with ¾-in. screen. A flap gate is utilized to combine the minus 8-mesh and minus ¼-in. products or a part of the minus ¼-in. plus 8-mesh product can be wasted to meet the final sand gradation requirements.

In the two 72-in. dia. by 10-ft. 6-in. long Telsmith Super-scrubbers, the gravel enters at one end with a clean supply of water and a larger volume of water enters at the discharge end. All of the water with the disintegrated gravel, clay and a small volume of sand leaves the scrubbers through the perforated receiving end and passes to the waste flume. The washed gravel is discharged at the opposite end of the scrubber. Thus the waste product combined with the wash water is removed at the end where all the gravel enters and as the gravel stream progresses through the scrubber it constantly encounters cleaner water until it is discharged finally to the sizing screens. The operation of these Super-scrubbers is somewhat similar to that of a ball mill. The speed of rotation is such that the gravel is carried nearly to the top of the cylinder as it rotates, and it then drops to the moving bed of gravel at the bottom. This constant action agitates and scrubs the gravel thoroughly and disintegrates any clay or soft stone that may be present.

The two 3- x 8-ft. Telsmith sizing screens are double deck units. The sizing is accomplished on the ¾-in. top deck. Since water is added here to give the gravel a final rinsing, the lower ¼-in. deck serves to dewater the gravel. From here, the final washed and graded ¾-in. and 1½-in. gravel is transferred on two parallel-running 24-in. conveyor belts to the respective compartments in the storage bin.

Crusher grits from the secondary scalping screen are dewatered on a 3- x 8-ft. Telsmith vibrating screen equipped with a No. 12 mesh screen cloth. This screen is mounted on a 50-cu. yd. Blaw Knox steel bin. The grits are trucked away to ground storage as they are a waste product as far as the aqueduct contract is concerned, but it is expected that a market for them will develop.

Below: Elevation drawing showing crushing, screening, and sand classifying equipment

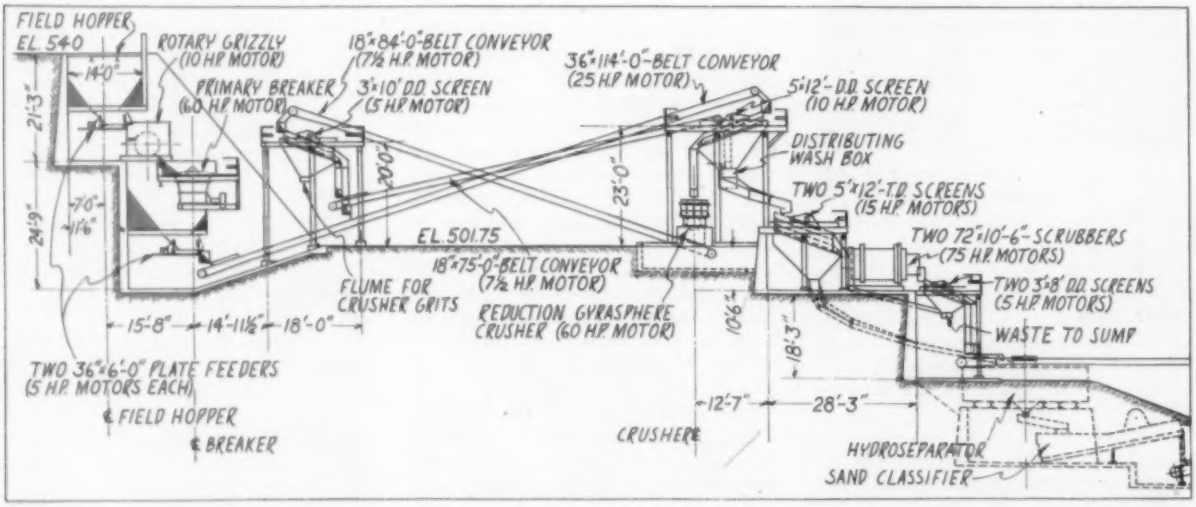
Hydroseparation and Classification Recovers Fines

Sand washing and grading practices follow those demonstrated in the past at large western operations. In fact, they are replicas of a section of the sand preparation plants at the Boulder, Grand Coulee and Shasta dam projects. Just as in these instances, the first step is hydroseparation to remove excess fines and water, and the second step is classification to produce a thoroughly washed and graded concrete sand.

As mentioned previously, the sand from the two 5- x 12-ft. triple-deck

Flexible hose connections to internal water spray nozzles in 5- x 12-ft. triple-deck sand screens. Note welded steel pan underneath

screens constitutes the feed to the Dorr hydroseparator, 24 ft. in dia. by 6 ft.-6 in. deep. Sand contained in this feed amounts to 180 tons per hour. The hydroseparator makes a separation at approximately 200-mesh, overflowing fine silt, clay and


FIELD HOPPER EL 540
ROTARY GRIZZLY (10 H.P. MOTOR)
18"x84'-0" BELT CONVEYOR (7½ H.P. MOTOR)
36"x114'-0" BELT CONVEYOR (25 H.P. MOTOR)
5'x12'-D.D. SCREEN (10 H.P. MOTOR)
PRIMARY BREAKER (60 H.P. MOTOR)
3'x10' D.D. SCREEN (5 H.P. MOTOR)
DISTRIBUTING WASH BOX
TWO 5'x12'-T.D. SCREENS (15 H.P. MOTORS)
TWO 72"x10'-6" SCRUBBERS (75 H.P. MOTORS)
EL. 501.75
18"x75'-0" BELT CONVEYOR (7½ H.P. MOTOR)
TWO 3'x8' D.D. SCREENS (5 H.P. MOTORS)
FLUME FOR CRUSHER GRITS
REDUCTION GYRASPHERE CRUSHER (60 H.P. MOTOR)
WASTE TO SUMP
TWO 36"x6'-0" PLATE FEEDERS (5 H.P. MOTORS EACH)
℄ FIELD HOPPER
℄ BREAKER
CRUSHER
HYDROSEPARATOR
SAND CLASSIFIER

micaceous material suspended in excess water to the settling basins. The underflow from the hydroseparator consists of plus 200-mesh sand in the form of a sludge containing 50 to 60 percent water by weight.

The sludge underflow from the preceding hydroseparator is discharged by a spigot into the feed trough of a Dorr FX Classifier, 9-ft. wide and 25 ft.-6 in. long, set at a slope of 2¼-in. per foot. Here a separation is

One of the scrubbers with steel discharge chute to gravel sizing screen

made at approximately 100-mesh. The minus 100-mesh overflow from the classifier, consisting of some fine sand fractions in addition to small amounts of silt and micaceous material, joins the overflow from the hydroseparator and flows with it to the settling basins. The final washed and graded sand product discharged by the classifier is all minus ¼-in. plus 100-mesh and at a moisture content of approximately 20 percent water. This final sand product is discharged on to a steeply inclined steel chute feeding a 24-in. wide belt conveyor, which delivers the sand to its compartment in the storage bin.

Water, under pressures that will vary from 15 to 40 p.s.i., is utilized in the scrubbers and on all screens with the exception of the 5- x 12-ft. scalping screen. The waste water, removed at the grit screen, scrubbers, sizing screens, hydroseparator, and the sand classifier, is flumed to the settling basins.

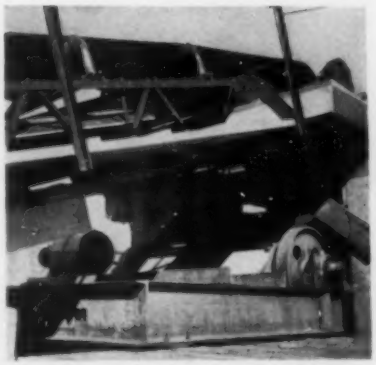
A total of 2500 gal. of water per minute is used in the plant. This is pumped from a nearby creek with an 8-in. Worthington centrifugal pump that is direct-connected to a 250 hp. motor. The total pipe friction, static and pressure head is 300 ft. A duplicate emergency unit also has been installed.

Central Motor Control

Each unit in the plant has its individual motor drive. For extremely dusty conditions, fully enclosed fan cooled motors are employed. Splashproof or fully enclosed fan cooled motors are used in wet locations and standard open type motors are employed in the more normal or favorable locations. Each motor has its automatic starter with push button control. All motors are controlled from a central control station, located at a point where the attendant can observe the operation of each unit. A radio intercommunicating system is installed at important locations so that the control attendant can be fully advised whenever a motor is to be started or removed from service.

Storage and Loading Bin

The Blaw Knox steel storage and loading bin has a capacity of 1500 cu. yd., and is divided into three equal compartments to hold the sand, ¾-in. and 1½-in. gravel. The bottom of each compartment is V-shaped and equipped with six 18- x 18-in. Telsmith "Simplex" type bin gates. Gate control levers, extending downward to within easy reach, are operated by the truck loading attendant. The delivery ends of the three parallel finished product conveyors are mounted on a steel superstructure above the bin. The bin has been set at an angle of 19 deg. to the centerline of the plant. This brings the bin in line so that each conveyor discharges its product at the center of its respective bin compartment. A steel stairway leads from the ground to top of the bin, and there are ample interconnecting stairways and walkways atop the bin to allow passage between the



Below power end of 18-in. conveyor is a 3- x 10-ft., double-deck secondary scalping screen

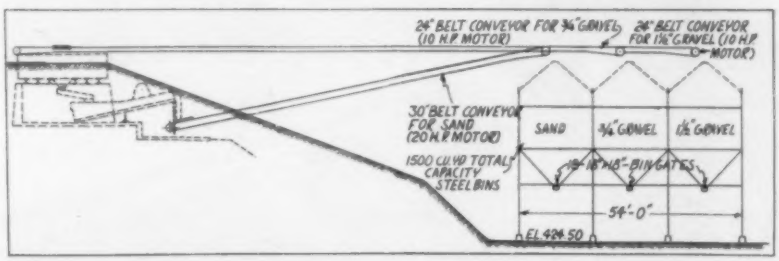
conveyors. Steel ladders lead down to the bottom of each bin compartment.

Conveyor frames, idlers and conveyor drives were built by the Barber-Greene Co. The idlers are equipped with ball bearings. The drive mechanism is housed in steel enclosures with the motors, in all cases, except the 36-in. main conveyor and the 30-in. sand conveyor. These conveyors required larger motors and they were located to one side of the conveyors.

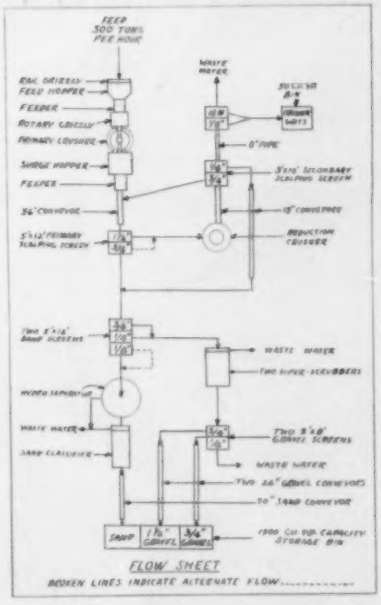
Under normal operating conditions, the plant will be run by a crew of 19 men. These will include the general superintendent, foreman, two shovel operators, two shovel oilers, three truck chauffeurs, master mechanic, electrician, plant oiler, operating attendant, receiving hopper attendant, two general maintenance men, truck loader, pump operator and bookkeeper.

In a later article, the ready mixed batching plant, supplying concrete for the Delaware Aqueduct, will be described.

Below: Showing conveyor system and bin storage arrangements after material leaves main plant


24" BELT CONVEYOR FOR ¾" GRAVEL (10 H.P. MOTOR)
24" BELT CONVEYOR FOR 1½" GRAVEL (10 H.P. MOTOR)
30" BELT CONVEYOR FOR SAND (20 H.P. MOTOR)
1500 CU.YD TOTAL CAPACITY STEEL BINS
SAND
¾" GRAVEL
1½" GRAVEL
18"x18" BIN GATES
54'-0"
EL 424.50

Right: Flow sheet of materials passing through the entire plant. Broken lines indicate alternate flow



Laminating machine in foreground and discharge end of roller dryer

By ROBERT S. STANGLAND*

Automatically-Controlled Wallboard Plant

Eight-deck roller dryer has three zones, two for heating and one for tempering. Truck hauls stucco from calcining mill to wallboard plant in 18-ton loads

FIRE swept through the Delawanna, N. J., gypsum wallboard plant of the Newark Plaster Co., Newark, N. J., in March, 1940, but steps were immediately taken to construct a new board plant at South Kearny, N. J., which is nearer its calcining mill in Newark and conveniently located for motor truck and rail shipping facilities. The new plant, which incorporates the latest equipment and methods of processing, started operations in November, 1940.

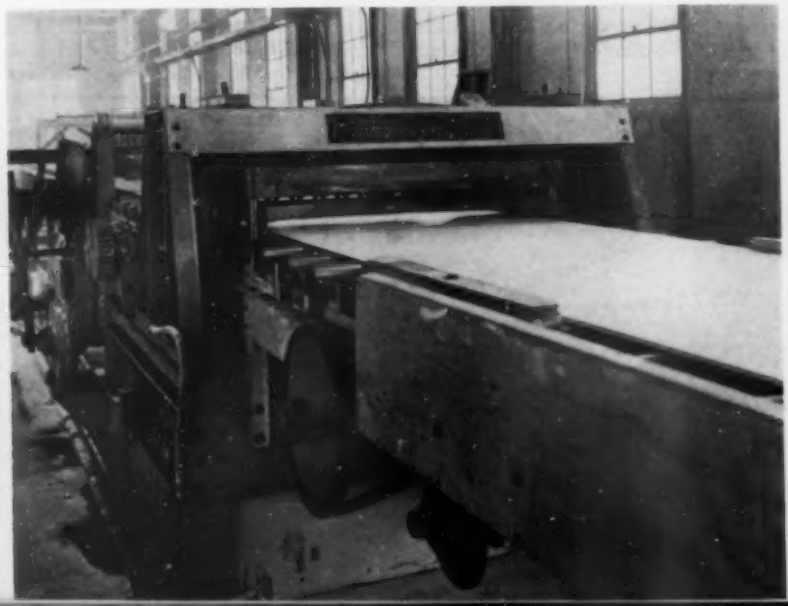
All types of gypsum board products, including sheathing, are produced in the new plant which is designed for a daily production of 210,000 sq. ft. of board. The building in which all steps in the processing are carried on is 760 ft. long and 80 ft. wide, and is completely fireproof. A railroad siding parallels one side, and the other side is arranged for truck loading nearly the entire length of the building. The building floor is at freight car floor level, and all machinery and stored products are at floor grade, with the exception of the ground cork storage and certain equipment accessory to the board machine.

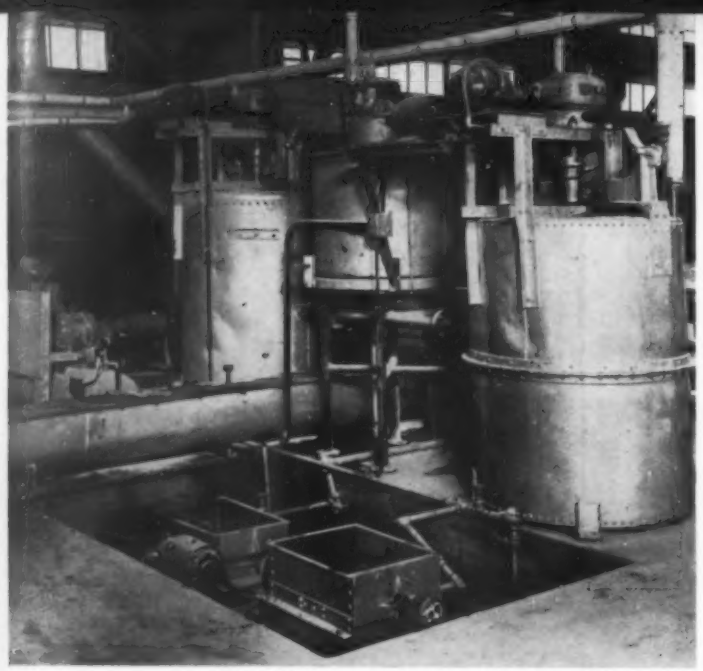
It is somewhat unusual to have the wallboard plant located at a considerable distance from the calcining mill, but this difficulty was overcome by transporting the stucco used in board manufacture with a tractor-trailer which shuttles back and forth between the two plants, a distance of four miles. The trailer, hauling 18 tons of stucco per trip, is equipped with an hydraulic hoist by means of which the load can be dumped quickly into a concrete dump pit large enough to take the entire load. Stucco is removed from the pit, which is within the building, by means of drag chains, and then by bucket elevator and screw conveyors into a steel storage bin of five compartments,

*Consulting engineer, Newark Plaster Co.

Drag chain feeder (dust tight casings removed) with variable speed control measuring stucco out to equalizer bin

Multiple punch for perforating lath as received from the feed side. At the time the picture was taken gypsum wallboard and not lath was being made. Behind the punch is the cut-off machine





Foam apparatus, showing starch and mixing tanks at higher level and cup feeders in floor well

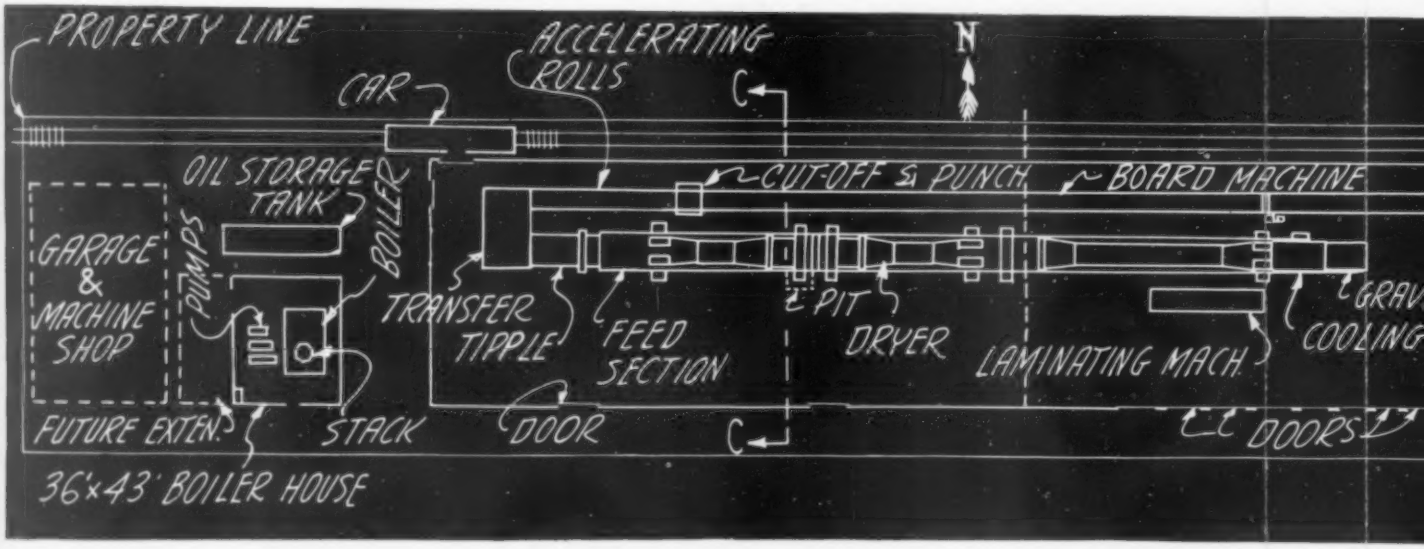
Gypsum to the Front

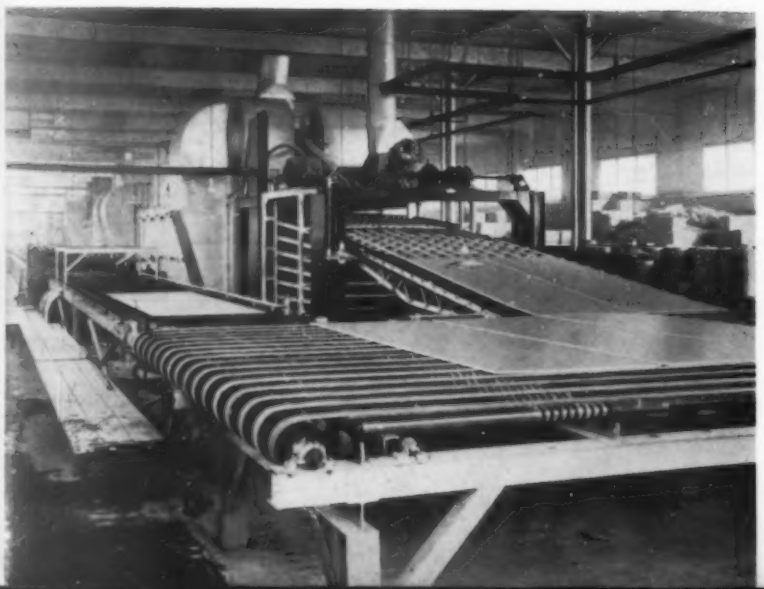
DEFENSE PREPARATIONS and the largest volume of residential construction since 1929 have stimulated the production of gypsum wallboard and other related products to the point where all plants are operating at maximum capacity.

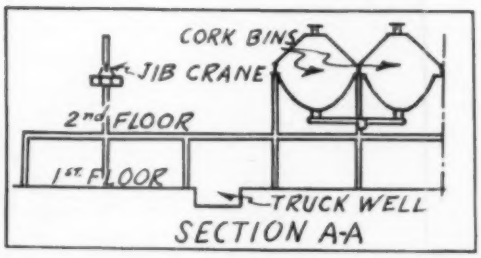
One of the most recently built gypsum plants is the Newark Plaster Co., wallboard plant at South Kearny, N. J., having a daily capacity of 210,000 sq. ft. This unit, replacing one destroyed by fire, is almost entirely automatic in operation as control apparatus is widely used throughout the plant. Intermittent operation of the stucco feed system is controlled by a predetermined bin level, and the different sections of the board machine are maintained at exact relative speeds by special receiver motors.

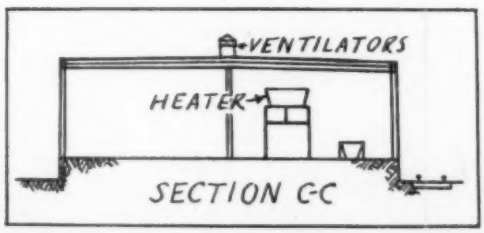
Reference to the flow sheet, below, and the photographs will show the reader at a glance the principal features of this plant. The accompanying article describes the operations.

Below: Flow sheet of gypsum wallboard manufacturing process

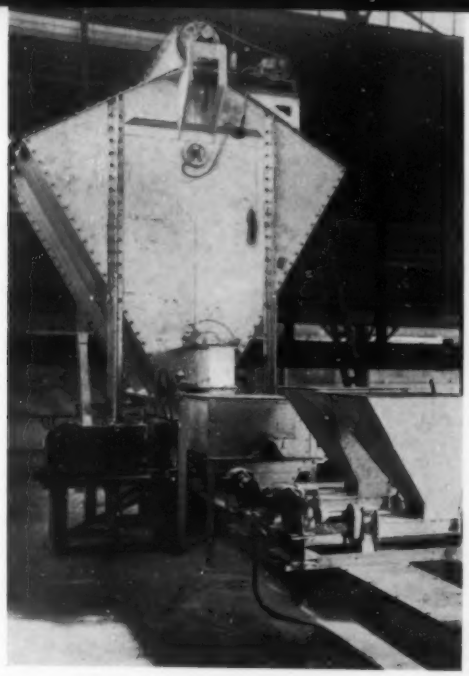




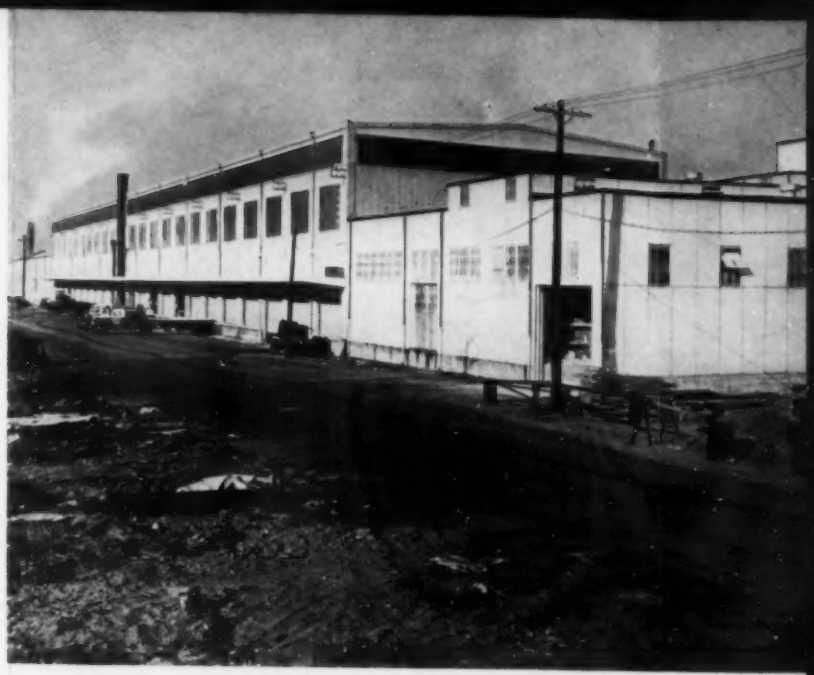




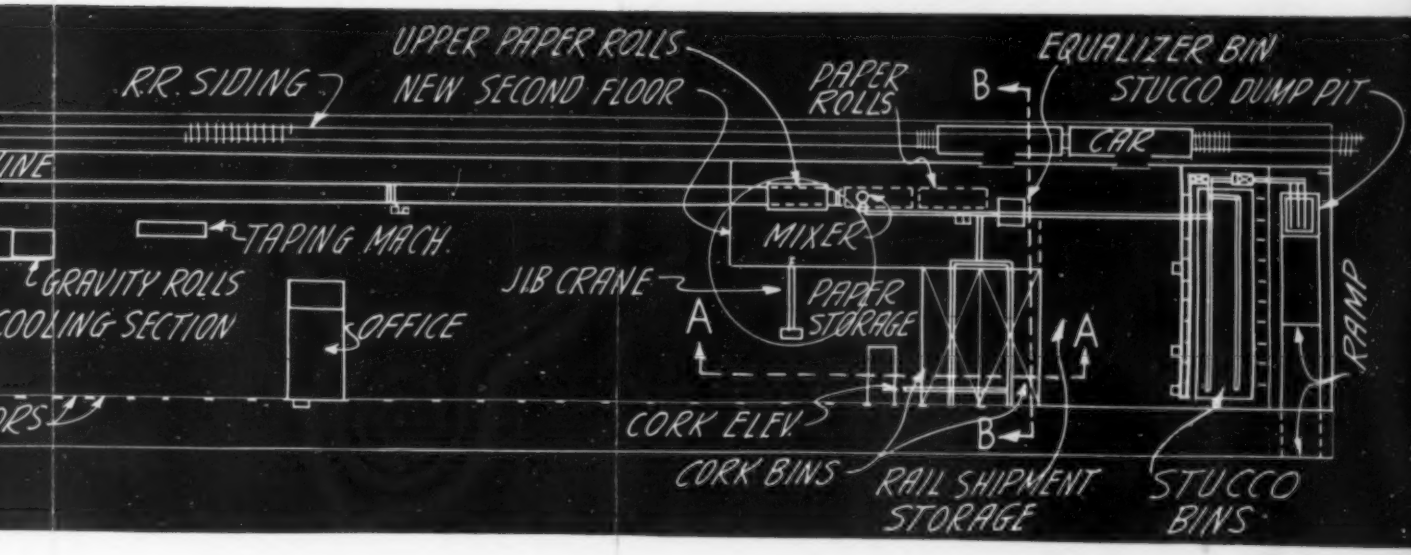
Left: Eight-deck roller dryer, looking toward the transfer and tipple end

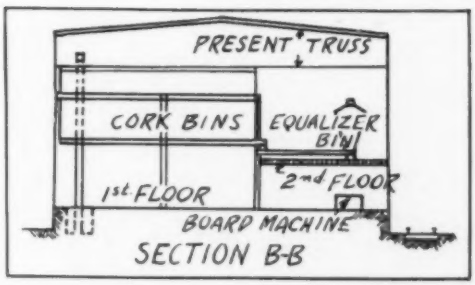


Above: Equalizer bin in background. Two chemical feeders and drives in foreground



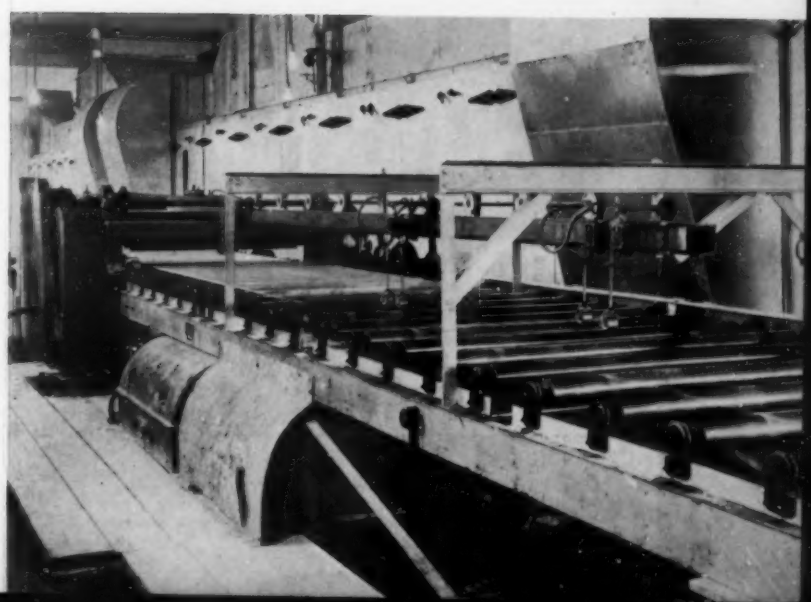
Exterior view of new wallboard plant of Newark Plaster Co., which replaces unit destroyed by fire





Above, and to the left: Elevation cross sections of plant showing location of equipment

Right: View of cut-off machine which parallels the eight-deck roller dryer



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...the NEW Plant of THE NEWARK PLASTER COMPANY

Swings into Operation

WITH pride, The Coe Manufacturing Company directs your attention to the new plant of the Newark Plaster Company, recently completely outfitted with the most modern Coe plasterboard manufacturing equipment.

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Making... RAYMOND BOWL MILL *a* NAME *in every...*

Write for Bowl Mill Catalog.

RAYMOND BOWL MILL

Equipped with air separator, as shown, the Bowl Mill is a highly efficient unit for coal grinding and direct-firing rotary kilns and furnaces. Operated with gravity discharge in closed circuit with a Raymond Mechanical Air Separator, the Bowl Mill is economically adapted for pulverizing non-metallic minerals and special manufactured products. Today, Raymond Bowl Mills are operating in thirty different states and four foreign countries with a total rated capacity of about five million pounds of coal per hour.

FIELD OF USE

Cement

A leading cement company recently installed nine Bowl Mills for coal grinding and direct-firing rotary kilns. This repeat order testifies to the efficiency of performance, as it makes a total of 23 Raymond Bowl Mills bought in the past four years, and now operating in the several plants of the company.

Lime

In a modern limestone plant, the Bowl Mill is showing record results in direct-firing a rotary lime kiln. It maintains an average production of 150 tons of burnt lime per day, and gives a lime-to-coal ratio of better than 3½ to 1. This means a lower cost with an equal or better quality of lime than previously obtained with producer gas.

Smelting

The Bowl Mill is giving excellent results in grinding coal for a central bin system for firing a smelting furnace. It operates at a capacity of 15 tons per hour on 75 grindability coal at a fineness of 85% passing 200-mesh.

Fertilizer

For pulverizing Florida pebble phosphate rock, the Bowl Mill is equipped with an integral separator and cyclone collector. It shows a record capacity of 40,000 pounds per hour to a fineness of 50% minus 200-mesh, and with a power consumption not exceeding 12 KWH per ton.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

aggregating in capacity 800 tons.

Stucco is removed from bin storage by a Link-Belt drag chain system arranged to insure thorough blending by simultaneous withdrawal from a number of compartments. Moving westward through a system of screw conveyors and bucket elevator, the stucco is delivered into a steel equalizer bin of 18 tons capacity mounted on a mezzanine floor, 30- x 100-ft., directly over the forming end of the board machine. Also located on this floor is the foam producing apparatus, the upper paper roll rack, the cork and B. F. Gump chemical feeders and other auxiliary machinery. Located to the south of the mezzanine floor are two large suspension bunkers with a combined capacity of 20,000 cu. ft. for storage of ground cork which is used as a core aggregate in the board products manufactured.

Motor trucks deliver the ground cork to the board plant, and it is handled into the storage bunkers by Redler "en masse" conveyor-elevators. From storage the cork is removed by drag chain conveyors having a variable-speed drive. This arrangement provides a means of measuring as well as conveying the material.

A Link-Belt drag chain feeder with variable-speed control measures the stucco out of the equalizer bin into a rotary scalping screen, thence into a mixing-screw conveyor where the cork and other dry elements are introduced. Moving 40 ft. westward in the mixing screw, the mixed dry materials are delivered through a vertical spout into the primary mixer at the board forming table on the main floor. Passing through primary and secondary mixers in series, with the addition of the required volume of water, the mix is deposited on the lower paper just ahead of the squeeze rolls, commencing its progressive journey on the board machine.

Specially-made tractor-truck and semi-trailer combination which hauls 18 tons of gypsum stucco from calcining mill to wallboard plant

Forming and Drying Process

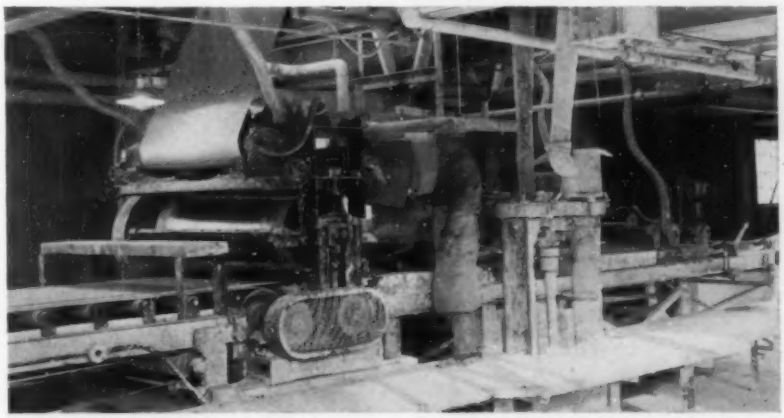
From the forming table to the cut-off, the board machine is 515 ft. long, comprising two setting-belt sections with white-surfaced belts 57-in. wide, and two live roll sections. A multiple punch of latest design for perforating lath followed by a cut-off machine is installed at the end of the second live roll section. This machine is designed to cut and perforate board and lath into all lengths required for convenience in handling and for market requirements. After the cut-off, the board is carried by accelerating rolls to the automatic transfer and tipple located at the extreme west end of the building, and then back east into the dryer. The board machine, belts, multiple punch, cut-off and accelerating section were furnished by J. B. Ehrsam & Sons Manufacturing Co.

The Coe eight-deck roller dryer, 254 ft. long, incorporating all the latest improvements, has three zones, two for heating and one for tempering. Air circulation in each zone is provided with a double fan of non-overloading type powered by a 50-hp. motor. Pipe coils in the two heating zones have 150 p.s.i. steam gage pressure, and the condensate is returned to the boiler room in a closed system, the return line pressure being slightly less than the boiler pressure.

Conveyors and Lift Truck Handle Dried Board

Methods of handling the dried board coming from the discharge end of the dryer are dependent on the type of board being processed. If plain or perforated lath is being made, the product is passed directly from the dryer take-off to the feed end of an automatic taping machine in which the lath is bundled and taped. When the lath or board is to be foil-backed, it is transported to the feed end of a laminating machine designed especially for the application of aluminum foil or other types of backing. The finished board is stacked in all cases on pallets of a type suitable for handling with a Clark gasoline - engine - powered lift truck which places the board in storage and later handles it from storage to truckside or freight car door.

For drying and other process requirements, steam is generated in a boiler house located near one end of the main board plant structure. A single steam generating unit has been installed, comprising a straight-tube Keeler boiler of the box-header type, having 5090 sq. ft. of heating surface and designed for 250 lb. pressure. It is fired by three Todd mechanical type oil burners with forced draft equipment furnished by L. J. Wing Manufacturing Co. The stack is of the induced draft venturi throat type mounted on top the boiler setting. A battery of three Micro-Westco electrically-operated pumps with automatic controls return the condensate to the boiler, and provide make-up water from city mains when required. To maintain constant boiler pressure and proper fuel combustion, recording and indicating instruments were used with the regulating apparatus.



Passing through primary and secondary mixers in series, with the addition of the required volume of water, the mix is deposited on the lower paper just ahead of the squeeze rolls, commencing its progressive journey on board machine

Automatic control apparatus has been widely used throughout the board plant. For example, the intermittent operation of the stucco feed system from storage to equalizer bin, starting when the stucco in the latter has been drawn down to a predetermined low level and stopping when the bin is full, is under complete automatic control. Levels of material in bins are controlled by Bindicators. The different sections of the board machine are maintained at exact relative speeds through the use of special receiver motors on each section, electrically interlocked with a Reliance master transmitter driven from a variable-speed drive unit which also operates the lath punch and cut-off machine. Both transfer and tipple are fully automatic. On the roller dryer are automatic humidity controls for the two heating zones and a dual control for the tempering zone. By means of a remote control acting on the variable speed dryer drive, the operator stationed at the transfer may adjust dryer speed to suit board machine speed. Remote control apparatus at a number of other locations insures immediate and exact response to the operator's requirements.

Control apparatus was provided by The Foxboro Co., Brown Instrument Co., Mercoid Corp., Clark Controller Co., and the General Electric Co. Variable speed drives were provided by Link-Belt Co., for chain; Reeves Pulley Co., for belts; and Allis-Chalmers Co., for V-belts. Constant speed drives were Link-Belt for chain and Allis-Chalmers for V-belts. Cleveland Worm & Gear Co., Link-Belt Co., and W. A. Jones Foundry & Machinery Co., furnished speed reducers.

Lime Putty Manufacturers Report Big Increase

NATIONAL LIME PUTTY PRODUCTS ASSOCIATION held its annual convention under a coöperative arrangement with the National Ready Mixed Con-

Stanley Smith, left, and Herbert Jahncke, presiding at recent lime putty meeting held in Cincinnati, Ohio

crete Association. Stanley Smith, Concrete Construction and Supply Co., Columbus, S. C., was re-elected president and Herbert Jahncke, Jahncke Service, Inc., New Orleans, La., was re-elected secretary. The Association now has 13 member companies.

Advertising and promotion, business conditions and operating problems were the principal subjects.

HERBERT JAHNCKE reported an excellent volume of business during 1940. His company shipped 30,000 cu. yd. of lime mortar, much of which was utilized in five housing projects. Practice is to mix sand and the lime putty first in this plant and then to add cement to the mortar. Transit mixing has been displaced by central mix, using five dump trucks.

Mr. Jahncke said that his chief difficulty is with water pockets in the lime putty which are sometimes troublesome when drawing from the tanks. Mixes in New Orleans are a 1:1:6 using a slag cement and a 1:1½:6 with a portland cement. Putty weighs 75 to 76 lb. Jahncke's experience is that pumping aged lime

Murray S. Simpson, left, and John Redd, right, both of Super Concrete Corp., Washington, D. C.

through a 4-in. line a distance of 100 ft. with an elevation of 25 ft. is very hard on the pumping equipment.

J. J. WARNER, Richter Concrete Corp., Cincinnati, Ohio, told of his company's development of control features for uniformity of lime content in batching mortar. This plant has also been changed to central mixing and sells lime mortar through building supply dealers in the same way that ready-mixed concrete is handled, rather than to contractors.

C. A. MIDLAM, of the same company, also took part in the discussion of Cincinnati operations and emphasized the importance of not overlooking small jobs. At first this company had difficulty in getting the proper mortar sand and has set up its own specification. Sand now used has a fineness modulus of 2.0, with not more than 2 percent retained on an 8-mesh screen and with 20 to 25 percent through 50-mesh.

MURRAY S. SIMPSON, Super Concrete Corp., Washington, D. C., said that his company's greatest difficulty was in getting high quality sand. Volume of business in 1940 equalled that of 1939 without any particular sales effort.

D. W. THOMPSON, Heston Concrete Co., Indianapolis, Ind., reported that 1940 volume equalled that of 1939 and that sales are made direct to masonry contractors. Dump trucks are used out of a central mixing plant. In Indianapolis, price is approximately 75c per cu. yd. higher on small jobs.

STANLEY SMITH advised that his company's 1940 volume was three times that of 1939, with 15,000 cu. yd. sold and three trucks operating out of a central mixing plant.

Water pockets and filtering in aging tanks were discussed thoroughly from the floor. Stanley Smith described how the filter sand is backwashed, which is done at a loss of 3 or 4 cu. ft. per operation. A washed concrete sand without minus 16-mesh particles is used in box filters. Hayden Brooks, Standard Building Material Co., Birmingham, Ala., recommended flushing between each filling of the aging tanks. His concern sold 27,000 cu. yd. in 1940. Mr. Brooks emphasized the importance of merchandising, with a reminder that building material dealers have no inventory or other investment in lime mortar.

J. J. WARNER said that the best way to eliminate water pockets is by plentiful air agitation in the tanks and that agitation should be started early in the aging period.

Hayden Brooks, Birmingham, Ala., listens attentively at lime putty meeting

Cement Packing Made Dustless

By W. H. CLEARY*

Modernization program of Southwestern Portland Cement Co., at Victorville, Calif., also includes new raw and finish grinding equipment, improved method of handling slurry, and Diesel truck haulage

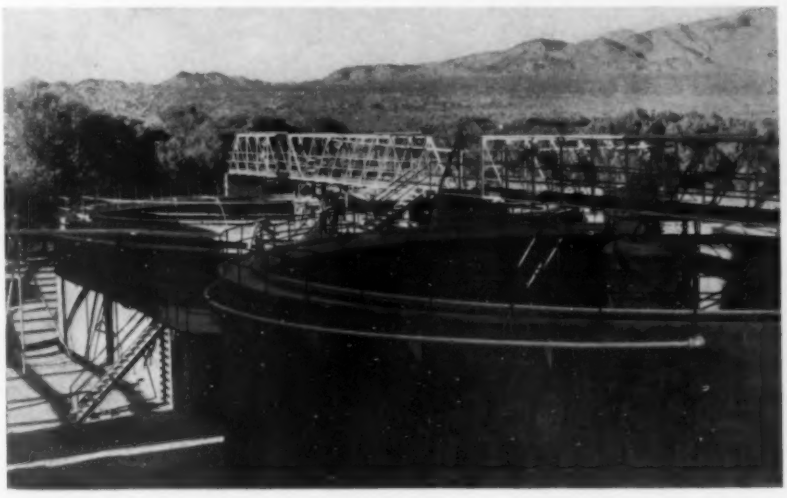
Diesel-powered truck and trailer combination for hauling cement. Note chain in trough to draw truck forward while loading

FOR THE PAST THREE YEARS, the Southwestern Portland Cement Co., Los Angeles, Calif., has had under way an extensive modernization program at its Victorville, Calif., plant. These improvements involved both raw and finished grinding, kiln operation, packing and loading, dust collection, and truck haulage.

In the slurry department, two 80-ft. diameter by 20-ft. high Dorr slurry tanks were added. These tanks each have a slurry capacity equivalent to 12,000 bbl. of cement. As installed, each tank was equipped with a mechanical agitator and also pipes for air agitation. Tunnels under each tank connect to a pump house, containing one model C-80 Fuller rotary compressor for air agitation, with a capacity of 396 c.f.m. and four Morris slurry pumps.

Two of these pumps are used for kiln feed and two for circulating the slurry by pumping from the bottom of the tanks at the center, and discharging through four pipes located at the circumference of each tank. The four 3-in. Morris slurry pumps are type "S," directly connected to electric motors. Circulating pumps are driven by 15-hp., 900 r.p.m. motors, and the kiln feed pumps are driven by 25-hp., 1200 r.p.m. motors. Pump impellers and linings are of Ni-Hard steel. With this type of pump it is possible to have the full head of the slurry tanks on the pump suction without leakage through the packing gland, and the necessity for a small feed tank, with automatic float control, is eliminated.

Two 80-ft. diameter slurry tanks equipped with special decanting arrangement. Portion of pump house may be seen between the tanks



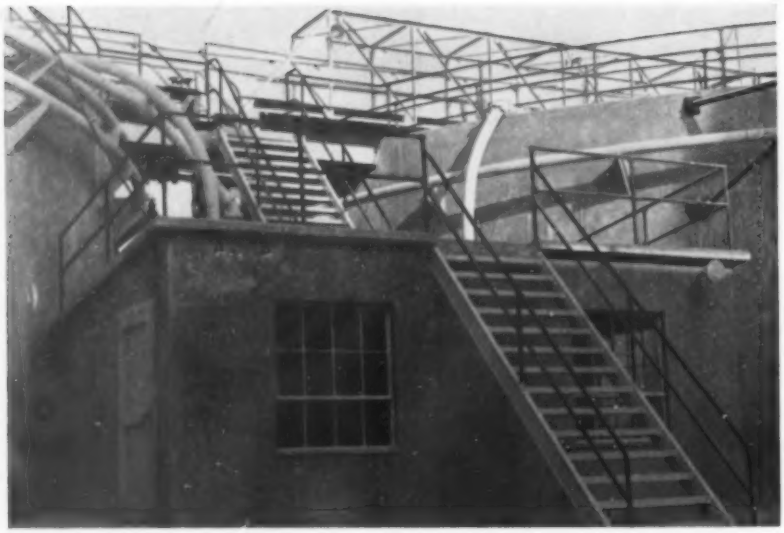
Decanting Arrangement Lowers Slurry Moisture Content

The sixteen 700-bbl. capacity concrete tanks, which comprised the original slurry tank installation, are now used as correction tanks. Slurry from these tanks is pumped to one of the 80-ft. tanks, which is designated as the "A" tank. It has been found unnecessary to use the air agitation in this tank, the mechanical agitator being operated intermittently on slow speed. The slurry is thus allowed to settle and, by means of a special decanting device, the water which accumulates on the top surface is drained off.

Slurry moisture, before the slurry tanks were placed in operation, averaged 37.4 percent. This has been reduced by approximately 4 percent due to the decanting of the water in the "A" tank. As the area of each 80-ft. diameter tank is about 5000 sq. ft., the weight of water one foot in depth over this area is more than 300,000 lb.

The water is decanted by means of adjustable funnels which connect to pipes passing through the tank walls about 5 ft. above the bottom. These funnels are adjusted by means of a hand-operated winch, and can be set at any height which is determined by

* Production Engineer, Southwestern Portland Cement Co.



Pump house between slurry tanks. Note indicating lights designating "A" and "B" tanks

Pump installation in tunnel under one of the slurry tanks, showing motors, switches and pumps

the height of the slurry in the tank during the decanting period.

Slurry is pumped from the bottom of the "A" tank to the second tank, which is called tank "B." Both mechanical and air agitation is used in this tank, and the slurry for the kiln feed is pumped from the bottom. The large capacity of these tanks gives both an exceedingly uniform mix and uniform moisture in the kiln feed which has resulted in a marked improvement in kiln operation.

Crusher Improvements Increase Capacity

Another improvement in kiln operation is the use of Ray-O-Tubes to achieve more uniform burning of the clinker and thereby reduce the amount of free lime. This is quite essential due to certain specifications which now call for a free lime content of less than ½ of one per cent in the cement.

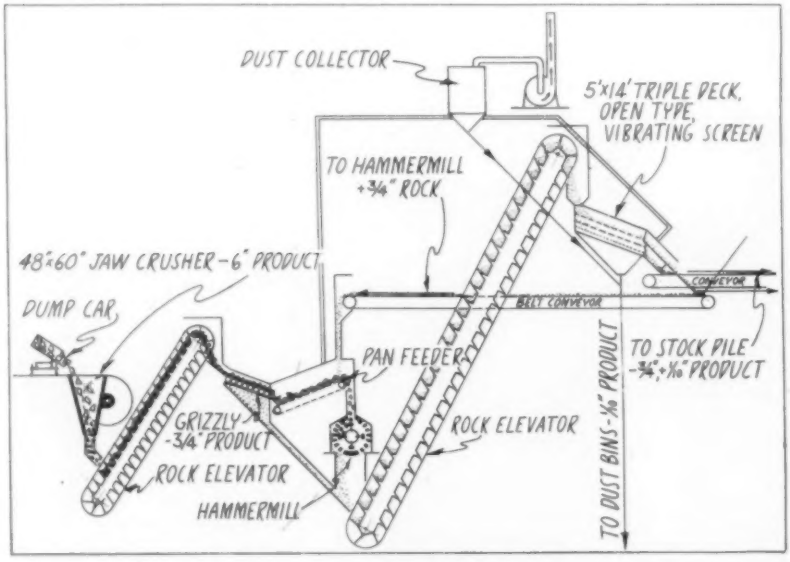
In the raw crushing department, one of the new reversible type Pennsylvania hammer mills has replaced an older type hammer mill. This installation necessitated the rearranging of the crushing machinery. The equipment now consists of an Allis-Chalmers jaw crusher as a primary unit, and an inclined elevator to deliver rock from the jaw crusher to a Robins grizzly which screens out the minus ¾-in. rock from the jaw crusher. The grizzly delivers the rock to an apron feeder which in turn delivers the rock to the Pennsylvania hammer mill. The hammer mill is operated in closed circuit with a 5- x 14-ft. triple-deck, Allis-Chalmers screen. Over-size from the screen, which at present is plus ¾-in. mesh, is returned to the hammer mill feed. Minus ¾-in. and plus 10-mesh product goes to the stockpile. Minus 10-mesh product discharges into bins, and from these bins is delivered to a tube mill in the slurry department where it is ground separately from the larger rock. The capacity of this particular tube mill has been materially increased and apparently, the capacity of the other mills grinding the coarser rock has not been lowered.

In the finished grinding department, two 20-in. Traylor type TY crushers, driven by 20-hp. motors, were installed for the purpose of reducing the size of clinker before it is fed to the finish mills. The crushers are operated in parallel, and crush the over-size from a Hum-mer screen, the fines from this screen being delivered directly to the mill bins. The size of the feed to the mills is all minus ⅝ in. mesh.

The increase in grinding capacity was not so very noticeable due to the fact that prior to the installation of the Traylor crushers the crushing was done with rolls which reduced the clinker to approximately the same size as the new units. However, the upkeep on the roll type crusher was excessive. There are five mills in the finish department.

Use Slat Conveyors and Dust Collector

Packing and loading equipment of both No. 1 and No. 2 packing houses



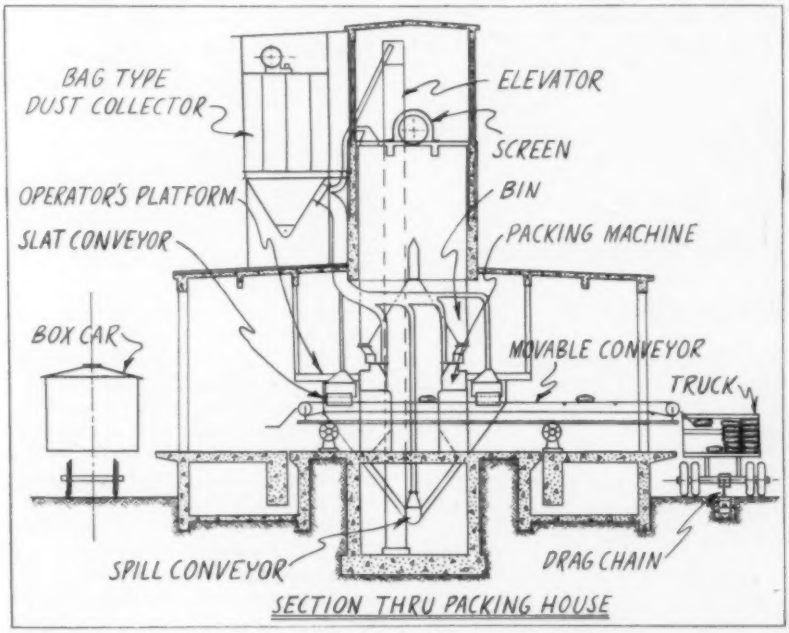
Showing new arrangement for more efficient crushing of raw materials and hook-up of dust collector

has been rearranged and new machinery added to obtain a faster and a more economical loading of bag-cement trucks, box cars, and bulk cement trucks.

The principal changes include the use of a slat conveyor for each packing machine, a movable belt conveyor, spill conveyor, spill elevator, and a Norblo dust collector for each pair of packing machines. Bins over the packing machines were also remodeled to make them self-cleaning. This is particularly essential due to the large varieties of cements now being manufactured.

Packing machines are set back to back, in pairs, each to the side of and parallel with the longitudinal center line of the packing houses. Each three-valve packing machine discharges the sacks to a slat conveyor. The two slat conveyors, which operate in connection with each pair of packers, discharge to a belt conveyor which is set at right angles to the slat conveyors. The object of the slat conveyors is to allow any dust from the sacks or spillage from the packing machines to fall through into the spillage hopper. To prevent contamination with other types of cement the spillage elevator discharges the cement back into the packing bin from which it came.

End of movable conveyor which may be used to load trucks at one side of building or to load freight cars at the other side



Packing room and loading out conveyor with system of dust collection designed to make this department as dustless as possible

The slat conveyors are built to the company's own design, and are 30-in. wide by 4 ft. 4 in. long, center to center of sprockets. Chain and sprockets were furnished by Link-Belt; SS No. 278 chain with K1 attachments holding 1½- x 30-in. half-round steel slats. The conveyor speed is about 175 f.p.m. The spillage hopper extends under the slat conveyor and the packing machine. As both the hopper and the packing machine are connected to the dust collecting system, the dust in the atmosphere is practically eliminated and the bags, when delivered to the trucks and cars are very clean.

Dust collectors, furnished by the Northern Blower Co., are located on the roofs of the packing houses. They are connected by 10-in. diameter pipes to the back of the packing machines, and also to the spill conveyors and to hoods over the discharge from the slat conveyors. Separate Norblo dust collectors are used for the silo vents and the screw conveyors under the silos.

Movable Belt Conveyor for Loading Trucks and Cars

The movable belt conveyor, which receives the bags from the slat conveyors, has rails on the bottom which ride on two sets of ball bearing stationary car wheels. In spite of the fact that the conveyor is about 40-ft. long, a pull of only about 35 lb. is required to move it out over a truck or into a box car by hand. The ease with which it moves is illustrated by the fact that it was found necessary to install an electric brake on one of the car wheel axles to hold the conveyor in position when loading.

Electric push buttons, located at the ends of the conveyors, control both the movement of the trucks and the electric brakes. To load a truck requires a crew of four men (not including the filling of packing bins and sack handling); one man on each packing machine and two men piling the bags of cement on the trucks. With this system, the trucks are loaded faster with fewer men, and since the packing crews have accustomed themselves to it, they much prefer it to the hand-trucking method formerly used.

Roller type chains, traveling in troughs which are in the pavement and parallel with the loading platforms of the packing houses, are con-

One of the fleet of 23 large Diesel trucks and semi-trailers used to haul bagged cement over the California mountains

nected by a steel link to the front axle of the trucks. As the trucks are loaded, they are moved forward at approximately the speed with which the loading is being done. A 60-ft. 100,000-lb. capacity Fairbanks, Morse scale is used for weighing the bulk-cement trucks, thus obtaining the exact weight during the loading process.

Operate 23 Diesel Trucks

Among the first to adopt the Diesel-powered type of truck for cement haulage, the company now has 23 units in regular operation, each having a carrying capacity of from 400 to 480 sacks. There are 15 Sterling, five Autocar and three Mack units equipped with Cummins Diesel engines, pulling Utility and Fruehauf trailers.

The terminal station for servicing trucks is at Victorville. A new concrete service garage was built, having 4000 sq. ft. of floor area. It is completely equipped for fueling, lubricating, repairing, and cleaning the truck. Four bulk tank tractors, each with a carrying capacity of 100 bbl., are included in the trucking equipment.

An operating force of approximately 46 truck drivers is required as both the packing house and the trucks are on a 24-hr. schedule. As the housing facilities at Victorville were inadequate to accommodate this additional number of employes, the company built 30 concrete houses for this purpose.

Hydrophilic and Hydrophobic Types of Aggregates

Most producers of aggregates for asphaltic type pavements and road surfacing have some difficulty grasping the distinction between "hydrophilic" and "hydrophobic" types. The following, from *California Highways and Public Works*, official magazine of California Department of Public Works, by F. N. Hveem, senior physical testing engineer, should help:

"Since the early beginnings of bituminous construction, ideas about mineral aggregates have undergone some change. It is no longer considered sufficient or even essential to specify that an aggregate shall be hard, sound, durable, and well graded. While it is true that durability is required, it is realized that durability and hardness are not necessarily synonymous, and the term 'well-graded' is rather indefinite. The open-graded and macadam types of construction require comparatively hard aggregate, but this requirement is of little importance in a dense-graded type of construction.

"An important contribution of research toward reducing the problems of maintenance has been a demonstration of the fact that mineral aggregates have widely varying surface characteristics which affect their capacity to retain an oil film in the presence of water, and which may affect the stability of the mixture. In the early days of bituminous construction, many of the failures were regarded as mysterious, and were the subject of much controversial discussion. It was customary to applaud the fortunate engineer who chanced to be in charge of work which turned out well, and to greatly criticize less fortunate individuals who were trying to construct oil roads with materials which, in the light of present knowledge, were definitely unsuited for the purpose.

Aggregate to Take the Blame

"The researcher has uncovered a great many facts about mineral aggregates which were unknown ten years ago, one result being to place the blame for certain failures where it belongs; not on the head of the hapless engineer or superintendent in charge, but on the type of mineral aggregate used. Many aggregates are definitely unsuitable for bituminous construction due to their tendency to lose asphalt in the presence of water. These aggregates are classed as hydrophilic, and should not be used without protective measures.

"Researchers throughout the world are now busily engaged seeking more effective or more economical means for treating such aggregates and oils. Progress is being made, but a great deal of work remains to be done. In the meantime, most laboratories are trying to avoid unsatisfactory materials by accepting or rejecting the aggregates and soils on the basis of preferential wetting, swell, or stripping tests. These measures have undoubtedly resulted in tremendous savings in maintenance costs. Most states can cite experience with hydrophilic aggregates, and their use has invariably led to continuous maintenance expense.

* * * * *

"Any discussion of the subject of hydrophilic and hydrophobic aggregates must necessarily become much involved if the problem is to be treated with any sort of fairness or accuracy. There are few people qualified to speak with anything like authority on the subject of free surface energy, and the factors which encourage or discourage the adsorption and retention of liquid films.

"There are no simple means yet available for classifying mineral aggregates in terms of suitability for bituminous construction. Aggregates may be identified according to petrographical or mineralogical classifications, but suitability for bituminous work does not parallel such groupings. Some generalizations may be made, if it is kept in mind that there are frequent exceptions. For example, reports from various states and countries show that granitic rocks may be either very good or comparatively poor. The same is true of limestone and most other types. Generally speaking, limestone, basalt, and trap rock are satisfactory, while quartz, chert, and rhyolite may well be viewed with suspicion. However, the only way to be sure is to test each individual material."

Progress In Non-Metallics

Industrial Minerals Division of American Institute of Mining Engineers holds annual winter meeting at New York

By NATHAN C. ROCKWOOD

ONE DAY'S SESSIONS of the Industrial Minerals and Milling Methods Divisions of the American Institute of Mining and Metallurgical Engineers contained more real information on progress in portland cement manufacture than any other single session of any organization the writer has ever listened to. Other sessions of the annual February (17-20) meeting of the Institute were of almost equal instructiveness and interest to rock products operators.

Kiln Operation

R. M. HARDGROVE, Babcock & Wilcox Co., brought uptodate progress in burning pulverized coal in direct-fired rotary kilns. He said that of 900 rotary kilns in the cement and lime industries, about 85½ percent are coal-fired, 9½ percent oil-fired and 5 percent gas-fired. Some 196 are equipped with direct-firing coal pulverizer units.

With the help of lantern slides and charts, Dr. Hardgrove summarized the results of a study of 88 cement plants in relating output of cement (or clinker) to square feet of kiln (or calcining) surface. Other charts showed the relations between kiln output, heat rate and firing rate for both dry and wet processes.

In burning pulverized coal it is not sufficient to know merely the percent passing 200-mesh. The burning characteristics of pulverized coal depend on the total surface area exposed to oxidation. Of two coals pulverized to the same percent minus 200-mesh, one may vary greatly from the other in total surface area, depending on the grindability factors of the two coals.

J. R. GREEN, Brown Instrument Co., described progress in instrumentation and control of rotary kilns. He brought out much information gained in the cement industry as a result of its sudden interest in instrumentation of processing, such as the importance of training a radiation pyrometer at the proper angle.

Permanente Cement Plant

A. M. KIVARI, Dorr Co., had an 80-odd page paper on the milling methods at the Permanente Corp.'s cement plant in California. In his absence an abstract was read and slides shown by T. B. Counselman, also of the Dorr Co. The paper itself is probably the most complete and comprehensive study of wet closed-circuit grinding ever made in the portland cement industry.

At the expense of repeating some of the data published in the article on the Permanente plant in the December, 1940, issue of ROCK PRODUCTS, pp. 31-56, the following from Mr. Counselman's summary is given, for it contains a different slant on the operation and some new figures:

The primary mills are a 9½- x 10-ft. Traylor and a 9- x 10½-ft. Smidth, each in closed circuit with a 16-ft. Multizone classifier.

Mill discharge is elevated by means of an 8-ft. sand wheel, fastened to the discharge end of the mills, to flow by gravity to the Multizone classifiers, then sands are returned to the mills by gravity. Capacity of these grinding circuits is 75 t.p.h each, when grinding ½-in. to 75 percent minus 200-mesh to 150 t.p.h. when grinding to 50 percent minus 200-mesh, and varies with the silica content of the limestone. For each percent reduction in $CaCO_3$ content the mill capacity drops about 2 percent.

The original secondary grind consisted of two 7- x 26-ft. single compartment tube mills in open circuit in which blended limestone (82 percent) and clay (18 percent) ground to about 65 percent minus 200, at 40 percent moisture, was ground to final size, 90 percent minus 200. The capacity was 60 tons per hour. By better control of thickener underflow, the moisture was dropped to 34 percent, and this immediately cut the capacity of the mills to 43 t.p.h.

Experiments were made with dispersants, and by using 1.75 lb. per ton of sodium silicate, and by this and certain other changes, such as somewhat finer grinding of the feed to these mills, to 75 percent minus 200, and a different ball charge, the capacity was brought up to 80 t.p.h. at 90 percent minus 200. These tests with dispersants have not yet been completed.

This, however, was not sufficiently fine, and instead of buying additional tube mills, short ball mills the same size as the primaries, 9½ ft. x 10 ft., were close circuited with 28-ft. diameter bowl classifiers.

In this case 11-ft. diameter sand wheels, fastened to the discharge trunnions of the mills, close the circuits. The grind is 95 to 96 percent minus 200-mesh, considerably finer than originally, and for high early, the grind is to 99 percent minus 200, with a resulting reduction in capacity of about 13 percent.

It is not possible to grind the clay in closed circuit with the limestone, in the secondary stage, because this particular clay, after being sufficiently diluted for classification, will not rethicken to a sufficiently low moisture. Therefore, the clay must be prepared separately and not be diluted below the desired point.

Therefore, about 10,000 bbl. of specification low-heat cement was made, grinding the limestone and clay separately, and mixing them after grinding without the knowledge of the burners. There was no trouble with the kiln, and the cement tested-up to all quality standards. Therefore, separate preparation of stone and clay was adopted. At first the blended limestone and clay was passed through one of the 7- x 26-ft. mills to insure intimate mixing, but later this mill was not available, and the blended mixture was pumped direct to kiln storage. It has been definitely demonstrated that the clay and limestone can be thoroughly mixed without being ground together.

This has made control easier, in that clay can be added to suit the composition desired, the grinding requirements of the clay and stone are not the same, so that it is more economical to grind them separately, alkali content is kept under better control, thickener areas are reduced, and altogether this is a most important technical point which has been thoroughly demonstrated on a very large commercial scale.

After the clay has been crushed in the Allis-Chalmers Pulverator, it goes to the first of the 7- x 26-ft. tube mills, converted to a two-compartment mill, with large balls (5 in.) in the first compartment, and 2½-

in. balls in the second compartment. The mill discharge is close-circuited with 28-mesh vibrating screens, the undersize going to the second 7- x 26-ft. mill in open circuit. However, the discharge of this mill goes to a storage tank, and then is reground through the same 7- x 26-ft. mill. Sometimes several regrindings are required to secure sufficient fineness. More than two-thirds of the power used in grinding the clay is required to reduce it from 52 percent to 85 percent minus 200. The ground clay then goes to storage in an 80-ft. slurry mixer.

The paper gives considerable information regarding ball charges, steel wear, liners, circulating loads, and complete screen analyses all through the grinding system; also a careful study of the concentration of the $CaCO_3$ and silica in the various sizes, at various points in the grinding circuit. These are given in tabulated form, and also plotted as courses. It requires careful study of the tables and charts to digest this information, and its presentation will not be attempted here.

The different types of cement are usually made by mixing and blending the raw materials until the composition obtained will produce the desired clinker components. Many times, addition of one ingredient to give say the desired amount of $CaCO_3$, will introduce too much silica, and so on. A certain ratio is desired between the total amount of SiO_2, and the combined Fe_2O_3 and Al_2O_3. Also the $CaCO_3$ must be above certain limits.

The Breerwood flotation process is a subtractive process, which segregates for discard excessive or undesirable oxides. This operation at Permanente, necessary only part of the time, is quite simple. At other plants it may be very complex. If raw materials from certain of the Permanente deposits are mixed to obtain the proper lime content, the iron and alumina ratio may be approximately 3.2. If the same raw materials go through the Breerwood plant, the ratio may drop to 2.86, resulting in a material that is easier to burn and grind. The justification for the Breerwood process is not only in the benefication of refractory raw materials so that it will be possible to make different types of cement, but to do so economically.

Referring to the flowsheet (see ROCK PRODUCTS, December, 1940), when the Breerwood process is used the primary classifier overflow is poured to two Hydroseparators in parallel, and deslimed. The overflow, at 5 percent solids, 97 percent minus 325, goes direct to the thickeners. This is about 20 percent of the weight. The underflow at about 30 percent solids goes to an agitator, to which cleaner tails are also returned, and the dilution adjusted to 25 percent solids to the flotation cells.

There are sixteen 66-in. Fagergren cells in two parallel rows. Concentrate from the first three cells, and from the cleaner cells, returns to the secondary grinding circuit. A scavenger concentrate is taken from the second three rougher cells to the cleaner cells. Tailing from the rougher cells goes to waste.

Only one flotation reagent is used, a partially saponified tattoel, in which the frothing portion is controlled by the degree of saponification. This reagent is fed to each cell, and the total consumption is 0.8 lb. per ton of dry solids fed to the cells.

The following figures show briefly typical work done, and this is considerably amplified in the paper.

	CaO	SiO_2
Hydroseparator feed (crude limestone)	48.0	12.0
Hydroseparator overflow	51.85	5.94
Cell feed	47.08	15.64
Cell concentrate	53.91	3.20
Reject	3.81	92.26
(Weight recovery 86.5%)		
Thickener feed	51.4	6.0

It is said that remarkably low grinding costs have been achieved at the Permanente plant because of the adoption of processing developed by mining engineers in ore dressing. In this raw grinding, for 27 percent greater power input, capacity was increased 100 percent; particle size control has been made easier, particularly insurance that the silica is as finely ground as the limestone.

Flotation Progress

JAMES NORMAN and BENJAMIN S. LINDSEY, U. S. Bureau of Mines, discussed laboratory experiments in the flotation of barite from Magnet Cove, Ark. The paper is a good example of the information obtainable from the Bureau of Mines on the extending applications of froth flotation to the industrial minerals. This particular barite is 85.1 percent, contaminated with silica and R_2O_3. It can not be separated from the quartz and other oxides when pulverized coarser than 100 percent through 325-mesh. At that fineness it can be concentrated to 98+ percent. Sodium silicate and fatty acids are used in the flotation. As a result of this laboratory work a commercial plant is being installed.

Better than anything else this illustrates *new* knowledge of flotation application. Breerwood has proved the feasibility of flotation of mineral particles of small micron sizes, at the Valley Forge Cement Co. plant. This knowledge is opening up an entirely new field in the concentration or benefication of useful industrial minerals.

OLIVER C. RALSTON, U. S. Bureau of Mines, also discussed new developments in flotation as applied to nonmetallics. In the discussion of his paper other methods, such as dry scrubbing of silica sands were mentioned.

J. M. PATEK, Eastman Kodak Co., described uses of the flotation process for both inorganic and organic materials. He presented flotation as a three-step process involving (1) flocculation; (2) particle coating; (3) frothing. The floatability of many substances can be changed by changing the pH value of the liquid. Flotation can be accomplished without frothing in some instances. The flotation of colloids is the biggest new use of the process, he said. Flocculation and flotation is being used for recovery where settling was formerly depended on.

Measuring Surface Area

FRED C. BOND, Allis-Chalmers Manufacturing Co., described an improved method of measuring area of a comminution product down to any desired particle size. The method is graphical and requires relatively little calculation. This paper is available from the Institute as Technical Publication No. 1296.

One interesting conclusion, although perhaps irrelevant, was that about as much energy is required to reduce a ton of quartz to particles of grind-limit diameter (about 0.7 micron) by grinding as is required to melt the quartz.

ARTHUR F. TAGGART, Columbia University School of Mines, proposed a new method of estimating crusher capacity and efficiency. Those interested can get the details by reference to Technical Publication No. 1297 of the Institute.

Oil-Well Drilling Fluids

A. GEORGE STERN, U. S. Bureau of Mines, described various minerals and their use in oil-well drilling muds—a subject of much current interest in many parts of the country. The preparation of these "muds" by industrial mineral producers is constantly becoming more of a science. Qualities desired and methods of testing were described by the author, and may be had in considerable detail in Bureau of Mines Report of Investi-

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Merchandising Crushed Stone

Balancing annual production against probable sales of different stone sizes increases profits

SELLING PRACTICES, and the standard sales agreement and contract used by The General Crushed Stone Co., Easton, Penn., were outlined by Geo. E. Schaefer* in his interesting address before the National Crushed Stone Association. He said particular care should be exercised in making quotations.

"Quotations should always be put in writing. Where rendered verbally, we always endeavor to confirm them in print, either by letter or telegram. In every possible case, we make them applicable to the particular project involved. Where competitive bidding takes place, we invariably lengthen the time of effectiveness to include ten days from formal award of contract, at the same time specifically stating that it becomes nullified automatically unless accepted within that period. Of course, there are exceptions to this rule, the same as any other, but the principal object is to eliminate the obligation of supplying material three or four months after the submission of the quotation, and frequently at a time when we might be hard pressed to handle the then current requirements."

Next Mr. Schaefer told of the precautions taken to determine the credit rating of low bidders on public works contracts. The terms of sale, quoted from the company's printed form is as follows:

"Quotations are made for material F.O.B. Cars or Trucks Seller's Plant, subject to Railroad Company's weights or plant scale weights, and to prior sales and change without notice except when made to cover specific work, and are effective for ten days from date unless this time is extended by special agreement in writing. Delivered prices are quoted only for the convenience of the buyer, the responsibility of the seller ceasing with proper delivery to the carrier. The Buyer is liable for any increase in freight and shall benefit by any reduction as the freight rates may be advanced or reduced.

Orders are accepted subject to delays due to strikes, accidents, shortage of cars, labor, fuel or material used in manufacture and production, to the exigencies of war and to all other causes beyond the control of the Seller.

Invoices for prepaid freight must be paid immediately upon presentation.

Should the Buyer's credit become impaired or payments delayed beyond the terms specified, cash may be exacted or shipments discontinued and order cancelled at the option of the Seller."

To expedite collections, the company allows a discount of 10c per ton "if all overdue invoices are paid and payment is made by the 22nd of the month next succeeding shipment." For a number of reasons, Mr. Schaefer said, government agencies were billed at net price.

Acceptance of orders and the sales contract are important considerations. Mr. Schaefer described his company's methods as follows: "Our usual method of accepting orders is to do so in writing. If the customer places his order verbally, we ask his acknowledgement of our acceptance so that both may know that the conditions are properly understood.

Disposition of Full Production

"During the peak period of production and demand, we are ofttimes asked to guarantee so many cars per day, or so many tons per day. We of course cannot guarantee anything, but assure such people that under normal conditions we can render the desired service. We also insist that they accept so many cars, or so many tons per day, for if we are willing to obligate ourselves to ship, there is just as much of an obligation on their part to accept, and not tie us up for an indefinite period by a suspension of deliveries with a resultant necessity on our part to seek other disposition. Naturally, there must be pliability throughout, and both parties must be governed by the individual circumstances.

"We use a standard form of Sales Agreement and Contract. This form was decided upon after lengthy study by producers in New York and Pennsylvania, as well as following legal advice. It protects both Seller and Buyer, and is reputedly one of the fairest and best contracts ever used in the crushed stone industry. It was adopted some few years ago both by the New York and the Pennsylvania crushed stone associations, and to the best of my personal knowledge, is now being used by a large number of firms in the East."

How to dispose of as much of the season's production, at a profit, as possible, Mr. Schaefer described as "the bug-a-boo of the stone man, for few of us dispose of our entire production at all times. We know, generally, that the least saleable size is what is known as screenings or dust, from ⅛-in., or ¼-in. down. The demand for the other sizes reaches its peak at various and different times of the season. Experience over a number of years at numerous plants has convinced us that the demand for the ½-in. material, or so-called dustless screenings, is practically constant throughout the entire operating period. Where ballast is produced, this is equally true except in early Spring and late Fall when recrushing operations are sometimes necessary. The heavy demand for the concrete and macadam stone usually comes during the late Summer. At this time, we usually exhaust what stock we have necessarily stored during the earlier months. In some localities, the 1-in. stone is not readily saleable at all times, and it becomes compulsory to stock this size. There is, however, a goodly demand in our territory for this size material before the quarry opens in the Spring, and also after the Fall shut-down.

"The sales department should be governed largely by the prevailing conditions at the quarry, and should always have uppermost in mind the acceptances of orders only of sizes commensurate with plant production. Too few of us give this the serious consideration it merits, but it is very evident that with the same overhead, a plant that disposes of eighty percent of its output is far ahead of one that disposes of sixty percent. Roughly speaking, I should say that our aggregate sales will run from 75 to 85 percent of our aggregate output.

"The seasonal operations of the plants under my immediate sales supervision generally run from the latter part of April to about the middle of November. As you may surmise, such plants are seasonal, and have an enforced winter period of idleness, due to climatic conditions. Other of our quarries, by reason of their geographical locations, have a more extended period of activity.

"During the Winter months, or rather in the interim from Fall shut-

*From a paper presented by Geo. E. Schaefer, district sales manager, The General Crushed Stone Co., Rochester, N. Y., before recent convention of the National Crushed Stone Association.

down until resumption in the Spring, we sell a considerable amount of material from stock. On some of such sales, we have received an additional price per ton to cover the extra cost."

Personality

In conclusion, Mr. Schaefer said: "I cannot refrain from mentioning briefly the importance of personality. We have found it extremely desirable to be in attendance at meetings and conferences of officials with whom we deal. We gather and file information in relation to future designated projects. We take an interest in the construction work in which our material actually is used, and render what assistance we can in facilitating deliveries. In short, we believe that personal contact goes a long way toward maintaining prestige, and friendly and satisfactory business relationship."

HARRY H. BRANDON, C. C. Beam, Inc., Melvin, Ohio, spoke of changes in Ohio specifications which demanded the billing of crushed stone on a dry weight basis. Since the amount of moisture varies with the weather conditions, the average being about 3 to 4½ percent, this complicates the sale and the pricing of the stone. The producer is being asked to guarantee a certain moisture content.

T. W. HAVELY, Central Rock Co., Lexington, Ky., said he had already met these requirements with a price based on the maximum moisture content. If the stone as shipped contains less than this maximum the purchaser of course gets the benefit—i.e., he gets actually more stone than he is billed for.

A. T. GOLDBECK, engineering director, National Crushed Stone Association, pointed out that there are two angles to the problem—the effect of the moisture on the actual dry weight of stone, and the effect on proportioning the materials for concrete with reference to the water-cement ratio. Probably it is the adoption of dry weight method of proportioning concrete which has led to the demand for a guarantee of moisture content.

PAUL R. ANDERSON, Marble Cliff Quarries Co., Columbus, Ohio, brought out the necessity of salesmen being kept informed on all plant conditions. He said few things impressed the purchaser so much as the salesman's familiarity with plant operating conditions. A very effective way of passifying disgruntled customers was to take them out to the plant and introduce them to the superintendent. After seeing the efforts made to give them what they want, they are satisfied.

Mr. Anderson said a study had been made of demand, which is seasonal as to sizes. First in the season comes ballast and highway material; highway surfacing stone comes into demand about June and this demand lasts all the rest of the season. Concrete aggregates are getting to be more and more in demand the year around; also macadam stone is sold the whole year. Agricultural limestone is a Spring and Fall business. By thus analyzing seasonality and kinds of business, storage is greatly facilitated.

C. E. BISCHOFF, C. C. Beam, Inc., Melvin, Ohio, said plant operation must be considered more and more from an inventory basis—carrying a variety of products in stock piles for instant deliveries. This called for good judgment in acquiring stock piles, if the material was to prove saleable.

JOHN RICE, JR., chairman, asked about taking care of customers' complaints or rejections; did production men go out to see the customer? PAUL R. ANDERSON answered, yes, and with the company's engineer—the technical contact man. The salesman himself did not make the settlement. D. L. WILLIAMS, Virginian Limestone Corp., Ripplemead, Va., said that not having a large organization, he went himself on such occasions, taking the plant superintendent with him. He said most of the trouble seemed to come from the methods of sampling employed.

Progress in Non-Metallics

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gations 3556, published February, 1941, entitled "Role of Clay and Other Minerals in Oil-Well Drilling Fluids."

Dry Batteries for Blasting

S. L. WINDES, U. S. Bureau of Mines, discussed the precautions necessary when using B dry batteries to explode blasting caps. The substance of his remarks was that the internal resistance of the battery must be allowed for, and that a battery or a series of batteries might show sufficient voltage without having sufficient current to do the job.

The only discussion was a question: "Why ever use dry batteries?" This commentator had long since stopped using them because of misfires.

Rock Phosphate

D. B. KIBLER, JR., La Floridienne, J. Buttgenbach & Co., submitted a paper on the mining and preparation of Florida hard-rock phosphate, which was abstracted in the author's absence by Chester A. Fulton, Southern Phosphate Co. The paper (Technical Publication, A.I.M.M.E. No. 1315) gives details in regard to hydraulic stripping of overburden, using monitors with 250 p.s.i. at the nozzle and 5000 g.p.m. The rock is recovered from under water by dipper dredges and walking drag-lines on the bank. Processing includes screening, crushing, milling, rescreening, hand-picking and hydraulic classification, tabling.

Asbestos

SAMUEL H. DOLBEAR, Wright, Dolbear & Co., discussed the work of a consulting engineer in the examination and valuation of asbestos deposits. Mr. Dolbear has examined many small deposits in the Western States, as well as the world-famous deposits in Quebec, and his paper will be found to contain much helpful information for prospectors and owners.

Economics

Other papers on the economics of the industrial mineral industries included a summary on standardization of mineral aggregates, by J. R. THOENEN, U. S. Bureau of Mines; trends in specifications for cement, lime and gypsum, by NATHAN C. ROCKWOOD, editor of ROCK PRODUCTS; suggested specifications for ceramic raw materials, by B. C. BURGESS, United Feldspar Corp.; on dimension stone and slate by H. A. MEYERHOFF, professor of geology, Smith College; chemical raw materials, by W. M. MYERS, Pennsylvania State College; a general summary of the economic problems of the industrial minerals industries, by RAYMOND B. LADOO.

THOMAS L. KESLER and JERRY C. OLSON, U. S. Geological Survey, reported on the Survey's work on potentially strategic domestic mica. With imports shut off, domestic mica deposits are assuming major importance, and certain rare kinds of flawless sheet mica are literally worth their weight in gold.

HAROLD LADD SMITH, Vermont Marble Co., told a very interesting story of the activity of the New England Council in connection with the prospecting and development of mineral resources in this section. These resources are chiefly industrial minerals, or non-metallics.

Officers

The new chairman of the Industrial Minerals Division of the Institute of Mining and Metallurgical Engineers is Paul M. Tyler, economics division of the U. S. Bureau of Mines; and the secretary-treasurer is H. Herbert Hughes, also of the economic division of the U. S. Bureau of Mines.

Making Three Kilns Do the Work Of Four

By A. H. and G. E. ROBINSON*

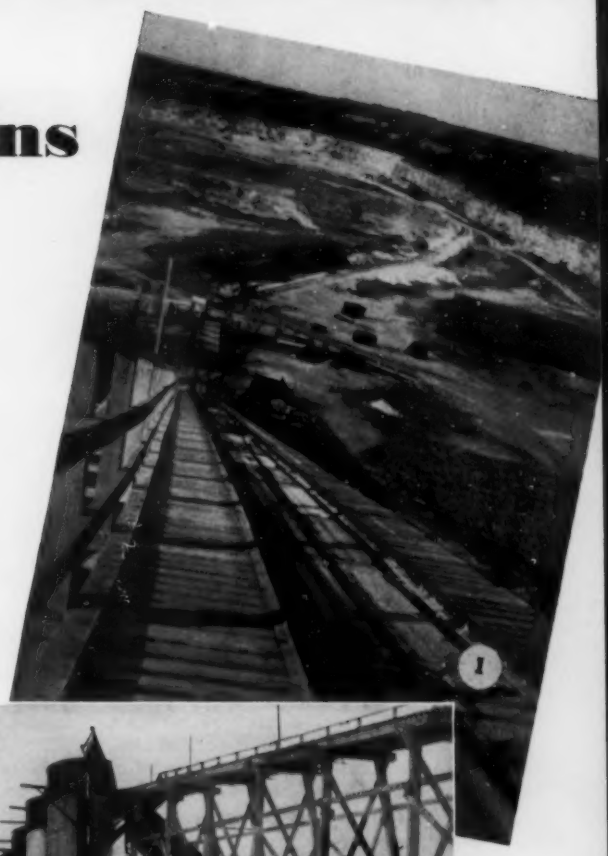

Fig. 1: Looking down incline, showing previously worked strata and wood piles formerly used. At bottom is ramp for trucks to empty limestone into dump car train

DOWN IN MID-TEXAS, where clean high-calcium Edwards limestone is plentiful, timber grows right up to your back door, and lignite has been mined for decades, the manufacture of lime on a big scale has been "old stuff" since grand-dad's courtin' days.

But now there's a new trend! Texas lime producers have found that natural gas, used in lieu of lignite or wood, brings various advantages. First, the gas-burned lime is cleaner; and the flexibility and control of gas permits the maintenance of more even calcining temperatures and the production of a more homogeneous, uniformly-burned product. Next, gas-firing does away with fuel-storage and ash-removal costs; allows the use of smaller "eyes" (unobstructed by solid fuel charges) so that radiation heat losses are minimized; makes it considerably easier to "break in" for a "fall;" and simplifies that all-important job of maintaining proper draft conditions through the kiln to flush out the carbon dioxide released in the calcining zone and preclude the slowing-up or actual reversal of the calcining reaction. But most important of all- natural gas firing increases kiln capacity as much as 45 percent.

Fig. 2: Austin White Lime Co. plant showing four stacks

Fig. 3: Charging mouth of a gas-fired, cylindrical kiln. Note absence of smoke

Says A. B. Garner, plant superintendent, Austin White Lime Co., McNeil, Tex., "With lignite we could never draw over 10 tons per kiln day; now with natural gas we can get 14½. Before, we could only draw once every four hours; now, if necessary, we can draw every three hours. We can get more lime out of three kilns on gas than we can out of four on lignite or wood."

Let's take a closer look at the Austin White Lime plant, and its four** currently operating vertical shaft kilns, three of which have been converted to natural gas for well over a year. For some 50 years the organization has been making lime, and since 1909 has been making it on the present plant site. Today, under the guidance of the sons of the founder, Austin White is turning out high-calcium lime products for the building trades, cold-water paint and whitewash making, water softening, oil refinery uses (principally anti-corrosion and grease manufacturing), chemical industries, sugar refining, paper mills (pulp cutting), and countless other applications. The production is sold in bulk or packaged in bags, barrels or drums—either as lump, crushed or pulverized quicklime, or hydrated lime.

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*A. H. Robinson and G. E. Robinson, sons of the founder of the company are president and secretary-treasurer, respectively, Austin White Lime Co.

**Three other kilns at the old plant nearby could be put into operation on short notice if necessary—making seven stacks in all.

Fig. 4: A. B. Garner, plant superintendent, is "breaking in" for a "fall". Notice the relatively small "eye" openings and the two gas burners

The typical analyses shown in the accompanying table indicate the purity of product achieved; and batches may be soft-burned or hard-burned according to the needs of the user for quicker slaking or greater stability and a percent or so more of available lime, respectively.

Limestone is mined with air drills and dynamite by surface quarrying methods after the top soil has been stripped with a dragline. Mexican labor reduces the rock to kiln size (3 to 8 in.), hand-picks it, and loads it into the buckets of a Brooks Load Lugger. Thence it is driven to a ramp at the plant, Fig. 1, dumped into 2-cu. yd. dump cars (each car-load calcining about 10 bbl. of 200 lb. each), and drawn on 30-gauge track by cable up the incline to be charged into the kilns 52-ft. above the draw floor. New land has been cleared to expose a fresh stratum of fine limestone (remarkably free from silica, alumina, and iron), and the timber is being utilized to fire the only one of the four kilns which (for this reason) has not yet been converted to natural gas.

Charging starts at 7:00 a.m. and continues until the operating kilns are full, and, of course, firing is a constant 24-hr. procedure. All kilns are cylindrical, Fig. 3, cased in steel plate, and lined with 9 in. of fire-brick at the top. This refractory lining increases to 18 in. thickness at the "neck," 19 ft. below the charging level, where the internal cross-section changes from round to rectangular (7½- x 5 ft.) to form the high heat zone. At the base of this heat zone and some 5 ft. above the firing deck, two eyes, one on either side of the kiln, are constructed to provide four side openings (two per eye) 15 in. square by 40 in. long. With wood or lignite firing, eyes must be at least 7 ft. long and much larger in cross-section. The net effects upon radiation heat losses and upon the facility of "poking" (through shorter unobstructed eyes) to cause a fall is obvious.

The gas burners (six per kiln) run into the calcining zone at a level just below the break-in openings in the eyes, Fig. 4, and consist of 1-in. pipe, capped and drilled for the proper orifice size, and inserted centrally in a 36-in. length of 3-in. pipe which extends to within 9 in. of the calcining-zone inside wall. The degree to which the gas-supply nozzle is thrust into the air-gas mixing chamber (which is the 3-in. nipple) is adjustable, and helps to regulate the length and fatness of the long, lazy, luminous flame which works up through the charge and accomplishes the calcining. The amount of air inspirated by the gas before combustion is regulated both by the pressure of the gas (usually 2 p.s.i. at maximum kiln capacity; 1¼ p.s.i. at minimum operation) and by a shutter-flange which can be spun forward to close to any desired degree the air opening between the 1-in. gas line and the 3-in. pipe.

TYPICAL ANALYSIS OF CHEMICAL HYDRATE

Calcium Oxide	74.50%
Magnesium Oxide	0.32%
Iron Oxide	0.07%
Aluminum Oxide	0.09%
Silica	0.24%
Carbon Dioxide	0.22%
Loss on Ignition after deducting Carbon Dioxide	23.28%
Available Lime as CaO	73.39%
Available Lime as $Ca(OH)_2$	96.98%
Fineness: 99%	325 Mesh

The above analyses and tests made in accordance with A. S. T. M. Methods.

Center Burning Arrangement

One set of two burners is especially arranged to burn in the center of the calcining zone rather than at the wall—to facilitate heating of the core of the charge and eliminate any slagging of the refractory walls by interaction with limestone. This is done by conducting the gas centrally along an 18-in. square "cross-beam" of refractory which bridges the calcining zone just below the eye-level—and discharging it for combustion up through the top of the "cross-beam" right at the center of the kiln-cross section.

The calcining zone proper extends, it is estimated, about 2 to 2½ ft. above the firing level. A temperature of 1350 deg. F. to 2200 deg. F. is maintained according to the degree of soft- or hard-burning, and is checked every 15 minutes by thermo-couples in the calcining zone connected to an Alnor 4-station indicating pyrometer. It is estimated that about 5500 to 6000 cu. ft. of 1050 B.t.u. per cu. ft. natural gas are consumed per ton of lime produced.

Both because of the fact that natural gas contains no sulphur, and ample air drafts are easily regulated through eyes not clogged with burning wood or coal, gas-burned lime is claimed to be cleaner and whiter than either wood- or lignite-fired material. Also, it is not necessary to employ forced draft, and the expense of operating a 50-in. blower powered with a 20-hp. motor (previously used when forcing production with wood- and lignite-firing) is completely eliminated.

Water Reservoir In Each "Eye" Generates Steam

To get even whiter lime, Superintendent Garner has devised an ingenious new stunt. In one kiln he has built a 1½- x 1½- x 1-ft. water reservoir in each eye between the two break-in channels, and the steam developed from this water by the otherwise wasted heat in the eye refractories drifts up through the charge to accomplish a very noticeable bleaching action without the cost of installing a steam generator.

At each fall about twelve 300-lb. wheels (wheel barrows full) of calcined rock are broken down. Caution is exercised in not breaking down too much at one time and permitting unburned cores to fall into the conical

steel-plate discharge hopper at the base of each kiln.

After each fall, the calcined rock stands in the hopper until just before the next fall at which time a draw of about 15 bbl. is made through the shear draw-doors (see Fig. 5) hand-operated by pinions and gear segments. Each draw is then dumped on the concrete floor of the plant where it cools for at least two hours before being inspected and hammer-broken for the hand-picking of cores and such other extraneous material as may have been carried through the kiln. Hammer blow tests, both by ring and fracture, are made of each draw —to check for over and under-burning and to classify and control hardness, softness, and whiteness.

In all, a given piece of stone is in the kiln about 24 hr., taking about 17 hr. for it to work down through the preheating zones into the heart of the white hot calcining throat.

Special Lime Products

If the product is not shipped as lump bulk quicklime, many things may be done to it before sale. It travels by conveyor belt to a shaker screen where surface impurities are removed and separated, and thence to the crusher where it is reduced to about ½-in. size. An enclosed bucket elevator lifts it to the top of the plant and discharges it into a screw conveyor from which it may be routed three ways by opening various combinations of gates. It may go to the pulverizer (Raymond No. 1) and be screened and bagged as pulverized quicklime; it may be packed in barrels or drums as crushed quicklime; or it may travel through a fan and cyclone separator and be caught as finely divided air-floated lime for bagging.

TYPICAL ANALYSIS OF QUICKLIME

Calcium Oxide	98.70%
Magnesium Oxide	0.41%
Iron Oxide	0.07%
Aluminum Oxide	0.04%
Silica	0.11%
Carbon Dioxide	0.37%
Available Lime as CaO	96.50%

Fineness of Pulverized Quicklime:

Building Lime: 90%	100 Mesh
Chemical Lime: 95%	325 Mesh

Of recent years, of course, there has been a growing demand for pulverized quicklime, which is finely ground (300-mesh) and air separated so as to require less aging time after slaking and before application. Hydrated lime is manufactured at Austin White Lime Co., in a four-drum continuous Kritzer hydrator (see Fig. 6).

Fig. 5: Making a draw from the conical hopper into which the "fall" dropped

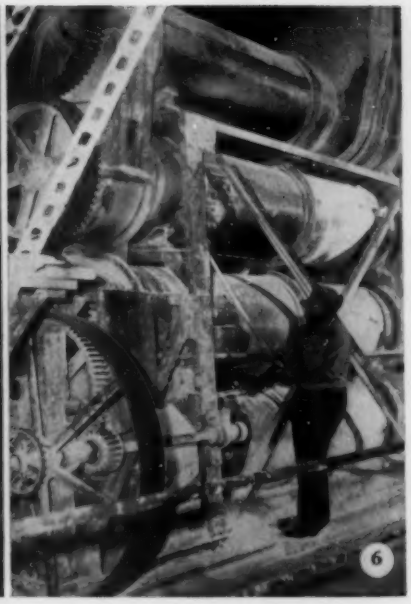

Fig. 6: Checking output of the 4-drum continuous hydrator

With respect to the economies of natural gas firing at the Austin White Lime Co., it is reported that, in addition to all the speed and product-improvement advantages noted above, the fuel cost per pound of saleable quicklime is actually the same or even lower than that which would be experienced with purchased wood or lignite firing. The savings in draft-fan power have been mentioned. Further, the costs of coal handling (10c per ton out of the car, and 5c per ton into the storage hopper) are eliminated. And the actual monetary savings in time, labor, space, and plant arrangement, needs no elaboration.

The Lone Star Gas Co., suppliers of natural gas, ran five additional miles of gas supply line to the lime plant from the previous southern extremity of the pipe line system at Round Rock, Tex.

Mining Hazards From Poisonous Gases

U. S. Bureau of Mines, Explosives Division, in its annual report of investigations, R. I. 3537, summarized, among other things, the results of studies made on poisonous gases from explosives and the underground usage of Diesel engines. Studies have been made of the effects of carbonaceous blasting accessories and the composition of the gaseous products from detonations in mines. It was concluded that such accessories invariably caused an increase in the volume of carbon monoxide and therefore led to added hazards from gases.

Studies on Diesel locomotives were conducted to develop recommendations and requirements to establish safe practices and safer designs for operation in mines. Hazards considered are those to health due to the discharge of harmful gases from the exhaust of a Diesel engine and those due to the possibility of explosion in operating a Diesel engine in an inflammable atmosphere. The rock products industry is concerned mainly with the health hazards.

Exhaust constituents that may create harmful or objectionable atmospheres are carbon monoxide, oxides of nitrogen, carbon dioxide, aldehydes, soot and oxides of sulphur. At fuel-air ratios where there is more fuel than the air can consume completely, the concentration of products of incomplete combustion increased rapidly with an increase in the fuel-air ratio. Gasoline engines generally operate in this rich range, whereas Diesel engines operate on the lean side; making Diesel engines less hazardous to operate.

Diesel engines, on the other hand, can also produce dangerous concentrations of carbon monoxide if improperly operated with fuel-air ratios on the rich side. For these reasons, it is recommended that the atmosphere in which the engines operate be examined frequently to determine whether or not the concentrations of objectionable constituents of the exhaust are within the permissible limit. Also, the engine should be inspected frequently to prevent or correct maladjustments that might make operation hazardous.

Evaluating A Puzzolan

Autoclave tests provide a ready means of quantitatively determining maximum amount of puzzolan that might be added to lime or portland cement

By H. McC. LARMOUR,
E. L. McMASTER
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INCREASING use of portland-puzzolan cements has made it necessary for the portland cement manufacturing chemist to concern himself with the relative merits of puzzolans.

Many of us have considered puzzolan cement in a somewhat casual way, believing it an outmoded product of the early Romans. However, recent records reveal that authorities have high regard for portland-puzzolan cements. The following noteworthy projects built during the past 30 years are worth mentioning as evidence:

Los Angeles City Aqueduct, 240 miles long.

Elephant Butt Dam, 605,000 cu. yd. of concrete.

Arrowrock Dam, 585,000 cu. yd. of concrete.

Bonneville Dam, 600,000 cu. yd. of concrete.

San Francisco Bay Bridge (San Francisco-Oakland), 104,000 bbl. of portland-puzzolan cement.

Golden Gate Bridge (San Francisco), 232,000 bbl. of portland-puzzolan cement.

Although nearly all of the projects mentioned are massive structures, consumer demand in some areas is steadily increasing the use of portland-puzzolan cements for stucco, masonry, sulfate-resistant and irrigation ditch lining concretes.

Our problem as manufacturing chemists concerns a study of those puzzolans economically available to our plant that would satisfactorily meet field conditions in a highly competitive market. Searching for literature available we noted that while much had been written on puzzolanic activity, we found little of direct help.

Briefly, this search revealed that the Romans as early as 600 B. C. discovered that intergrinding friable lavas with lime produced a cementitious material that had the then remarkable property of hardening while submerged in water. One method common to both early and modern investigators was to evaluate puzzolanic activity by strength gain with time for a puzzolan - lime - sand mortar. Nearly all specifications included certain chemical and physical limitations deemed necessary through experience, or by opinion of the specification writer. Also when writing his specification he was influenced by those puzzolans that had grown desirable through generations of satisfactory performance.

Our review of test methods led us to decide that the procedure outlined by Prof. R. E. Davis for the proposed Bonneville Dam held the most promise. Essentially this specification was a strength test of puzzolan-lime-sand mortar specimens, stored successively at 70 deg. F. for 12 hours; then 100 deg. F. for 12 hours; then 130 deg. F. until 12 hours before testing and then at 70 deg. F. for the final 12-hr. period before testing; specimens to be tested at 7 and 28 days.

We believed this test offered a ready means for quantitatively determining the maximum amount of puzzolan that might be added to a lime or portland cement.

It seemed only reasonable that the high temperature-pressure condition of the autoclave offered the ultimate for lime-puzzolan reaction.

CHEMISTS' CORNER

Reports of investigations in the rock products industries and comments on articles appearing in these columns are invited, as this is the purpose of the "Corner."

The siliceous materials in Table 1 were selected and properly prepared for puzzolanic tests. As a pilot, Friant pumicite, a puzzolan of well established reputation, was used.

TABLE 1. SILICEOUS MATERIALS SELECTED FOR TESTS

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	Insoluble	Loss
Fresno Pumicite	74.72	2.79	12.10	1.01	.53	95.85	
Ottawa Sand	96.25	1.24	.62	1.21	.29	99.45	
Oakdale Sand	66.85	5.92	14.63	5.65	1.89	90.18	
*Alusite	51.80	5.60	40.15	1.45	.10	96.75	
Montmorillonite	56.97	7.59	21.24	7.13	2.39	87.68	
The lime used: Hy-Tex (hydrated)	3.24	.25	2.10	69.79	.98	22.86	1.12

The idea of using higher temperatures to accelerate puzzolanic activity seemed logical. We believed that puzzolanic activity would be increased progressively with higher temperatures and pressure in a saturated atmosphere.

We further believed this progressive puzzolanic activity could be measured by the decrease in the insoluble residue. To explain: if a puzzolan reacts with lime when the two are mixed together as a paste and cured, the extent of such reaction should be manifested by a decrease in the insoluble residue of the mixture as hydration progresses. (Insoluble residues determined according to A.S.T.M. C114-35T).

Using the oxide analysis as a basis, "Hy-Tex" hydrated lime was mixed with each of the above siliceous materials in sufficient proportions to form mono-calcium-silicate Each mixture was gauged with water (40%), stored for 24 hours at 70 deg. F. and then autoclaved at 300 lb. for 6 hours.

The initial insoluble residues (prior to autoclaving) and the final insoluble residues (after autoclaving) are shown in Table 2.

TABLE 2	Initial Insoluble	Final Insoluble
Fresno Pumicite	52.10%	1.53
Ottawa Sand	49.56%	5.37
Oakdale Sand	47.13%	9.00
Montmorillonite	54.56%	13.20

*All chemists with Yosemite Portland Cement Corp., Merced, Calif.

* Alusite is a trade name for a high-alumina kiln lining brick.

On our second test we increased the hydrated lime by 10% to note its effect.

TABLE 3	Initial Insoluble	Final Insoluble
Fresno Pumicite	51.20	1.09
Ottawa Sand	43.90	3.02
Oakdale Sand	43.70	7.44
Montmorillonite	51.50	6.95

This second addition of lime indicated that in our first trial an excessive amount of puzzolan had been used for the lime addition. It also indicated the method held promise for measuring chemical activity. However, it would be hard to reconcile the use of such high temperatures and excessive pressures for an actual practice test. Concretes never attain such curing conditions.

In order to show how this autoclave test might be reconciled for evaluating the worth of a puzzolan under field conditions, parallel tests, storing the specimens at temperatures of 70 deg. F., 110 deg. F., 150 deg. F., and 212 deg. F., were made and insoluble residues determined after curing periods of 3, 12, 28, 60, 90 and in some cases, 150 days. These results are given in Table 4, above.

To brief the detail in this table, it might be well to consider the progress of the reaction by showing the percentage decrease of the insoluble residue at 28 and 90 days for all temperatures. This will be a measure of the reaction. As a basis for presenting the results, we assure the difference between the initial insoluble residue (before autoclaving) and the final insoluble (after autoclaving) represents the total amount of reaction. This is shown in Table 5, above, as percentage soluble.

The degree of reaction at any particular time and temperature is then calculated by determining the difference between the initial and the observed insoluble at the particular time and temperature desired. This difference is expressed as a percentage of the total soluble shown in Table 5.

Table 6, which follows, gives the progress of the reaction, as expressed in percentage of total soluble for four

TABLE 4. DETERMINING INSOLUBLE RESIDUES OF LIME-PUZZOLAN MIXTURES

Hydrated Lime	Puzzolan Friant Pumicite	Initial Insoluble %	Temperatures	Insoluble Residue % 3 Days	12 Days	28 Days	60 Days	90 Days	5 Months
51.0%	49.0%	52.10	70° F	50.7	50.3	47.02	45.12	41.34	
51.0%	49.0%	52.10	110° F	46.7	40.0	38.60		36.50	31.58
51.0%	49.0%	52.10	150° F	43.4	38.1	36.78	35.08	32.25	
51.0%	49.0%	52.10	212° F	38.0	34.3	28.51	24.09	14.66	
	Ottawa Sand								
56.5%	43.5%	49.56	70° F	48.2	47.9	47.46	48.66	48.55	
56.5%	43.5%	49.56	110° F	48.4	47.3	46.27	46.12	44.97	43.46
56.5%	43.5%	49.56	150° F	40.7	40.7	33.80	25.72		
56.5%	43.5%	49.56	212° F	35.7	33.7	13.15	12.22	10.31	8.87
	Oakdale Sand								
54.5%	45.5%	47.13	70° F	46.0	46.0	45.79	44.97		
54.5%	45.5%	47.13	110° F	47.0	39.9	40.60		40.80	41.44
54.5%	45.5%	47.13	150° F	42.8	40.5	32.83	28.77	24.04	
54.5%	45.5%	47.13	212° F	33.9	18.77	16.1	15.25	12.25	8.24
	Montmorillonite								
43.3%	56.7%	54.56	70° F	52.7	48.9	48.9	48.9	46.57	
43.3%	56.7%	54.56	110° F	49.4	47.4	41.56	39.2	37.97	33.67
43.3%	56.7%	54.56	150° F	30.8	33.3	29.35	26.6		
43.3%	56.7%	54.56	212° F	29.6	23.5	17.36	14.87	14.87	14.78

TABLE 5	Initial Insoluble %	Final Insoluble %	Soluble %
51.0% Hyd. lime plus 49.0% Pumicite	52.10	1.53	50.57
56.5% Hyd. lime plus 43.5% Ottawa Sand	49.56	5.37	44.19
54.5% Hyd. lime plus 45.5% Oakdale Sand	47.13	9.00	38.13
43.3% Hyd. lime plus 56.7% Montmorillonite	54.56	13.20	41.36

temperatures at two periods, 28 and 90 days.

These results, using hydrated lime with siliceous materials, indicated that the reaction proceeded regardless of temperature but rates of reaction were greatly increased with temperature.

We deemed this work with lime-puzzolan mixtures sufficient, and next proceeded to carry out similar tests with portland cements and puzzolans. It was decided to use a high and low limed cement for our first trials. Two siliceous materials were selected as puzzolans, Friant pumicite and Alusite. The analysis for these four materials is given in Table 7, below.

The fineness detail of these materials is given in Table 8.

TABLE 8	Minus 325 mesh
Alusite	96.0%
Pumicite	98.0%
High lime cement	97.0%
Low lime cement	94.0%

Mixtures of the cements and pumicite were made up in increasing percentages of the pumicite as shown in Table 9. The mixtures were gauged with water (40%), allowed to cure 24 hours at 70 deg. F., and then autoclaved 24 hours at 100 lb. and then 6 hours at 300 lb. pressure. The final insoluble residue for each mix is shown in Table 9.

The results indicate that for the given conditions of temperature, pressure and humidity, this particular puzzolan (Friant pumicite) has been

TABLE 6:	70 deg. F 28 Days	70 deg. F 90 Days	110 deg. F 28 Days	110 deg. F 90 Days	150 deg. F 28 Days	150 deg. F 90 Days	212 deg. F 28 Days	212 deg. F 90 Days
Hyd. Lime & Pumicite	10.04%	21.28%	26.70%	30.85%	30.29	39.25	46.64	74.04
Hyd. Lime & Ottawa Sand	2.29%	4.75%	7.45%	10.39%	35.66	53.95	82.39	88.82
Hyd. Lime & Oakdale Sand	3.51%	5.66%	17.13%	16.60%	37.50	60.56	81.38	91.48
Hyd. Lime & Montmorillonite	13.68%	19.32%	31.43%	40.11%	60.95	67.60	89.94	95.96

TABLE 7: TESTS WITH PORTLAND CEMENTS AND PUZZOLANS

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Loss	Free Lime	Insol.	C_4AF	C_3A	C_3S	C_2S	$CaSO_4$	MgO
High-Early (Portland)	22.40	1.92	3.84	66.09	1.51	2.51	1.32	1.00	.16	5.84	6.92	59.91	18.66	4.27	1.51
Low-Heat (Portland)	24.22	4.23	5.23	61.29	1.70	1.69	.78	.50	.56	12.86	6.68	21.53	51.62	2.87	1.70
Pumicite (Dry Basis)	74.72	2.79	12.10	1.01	.53	—	—	—	95.85						
Alusite (Dry Basis)	51.80	5.60	40.15	1.45	.10	—	—	—	96.75						

TABLE 9: RESULTS OF TESTS MADE WITH FRIANT PUMICITE

Cement Used	% (Wt.) Cement	% (Wt.) Pumicite	Autoclaved % Insoluble
High early	83.3	16.7	1.39
High early	76.9	23.1	1.59
High early	71.4	28.6	3.32
High early	65.0	35.0	3.03
High early	45.0	55.0	20.93
Low-Heat	83.3	16.7	0.91
Low-Heat	76.9	23.1	1.12
Low-Heat	71.4	28.6	1.80
Low-Heat	65.0	35.0	4.48
Low-Heat	45.0	55.0	39.33

TABLE 10: RESULTS OF TESTS MADE WITH ALUSITE

Cement Used	% (Wt.) Cement	% (Wt.) Alusite	Autoclaved % Insoluble
High Early	83.3	16.7	6.31
High Early	76.9	23.1	8.49
High Early	71.4	28.6	10.81
High Early	65.0	35.0	13.27
High Early	45.0	55.0	33.32
Low-Heat	83.3	16.7	6.61
Low-Heat	76.9	23.1	9.29
Low-Heat	71.4	28.6	12.01
Low-Heat	65.0	35.0	13.99
Low-Heat	45.0	55.0	37.80

quantitatively measured beyond lime saturation.

To investigate a puzzolan of unknown activity, alusite was selected for parallel comparison with the Friant pumicite. The results of this test are given in Table 10.

Considering these two puzzolans, Friant pumicite and alusite, we note that Friant pumicite gave much better results in all cases but one (which may be an error) than the alusite.

Curiosity prompted us to analyze the insoluble residue from several of the autoclaved specimens and compare the analysis with that of the original or the non-autoclaved puzzolanic material. Using the insoluble samples obtained from the tests shown in Tables 9 and 10, SiO_2 and R_2O_3 were respectively determined as shown in Table 11.

TABLE 11: DETERMINING SiO_2 AND R_2O_3 FROM INSOLUBLE SAMPLES

					Insoluble Analysis SiO_2	R_2O_3
High Early Cement	83.3%	Pumicite 16.7%	Insoluble	1.39	79.48	5.69
High Early Cement	71.4%	Pumicite 28.6%	Insoluble	3.32	91.27	2.93
Low-Heat Cement	83.3%	Pumicite 16.7%	Insoluble	.91	74.69	9.58
Low-Heat Cement	71.4%	Pumicite 28.6%	Insoluble	1.80	80.30	13.34
				Average	81.43	7.88
High Early Cement	83.3%	Alusite 16.7%	Insoluble	6.31	63.95	35.50
High Early Cement	71.4%	Alusite 28.6%	Insoluble	10.81	66.30	31.85
Low-Heat Cement	83.3%	Alusite 16.7%	Insoluble	6.61	72.40	27.55
Low-Heat Cement	76.9%	Alusite 23.1%	Insoluble	9.29	69.05	28.15
				Average	67.92	30.76

Comparing these averages with the original analysis of the puzzolans we note:

	SiO_2	R_2O_3
Pumicite Insoluble (Average)	81.43	7.88
Pumicite (Table 1)	74.72	14.89
Alusite Insoluble (Average)	67.92	30.76
Alusite (Table 1)	51.80	45.75

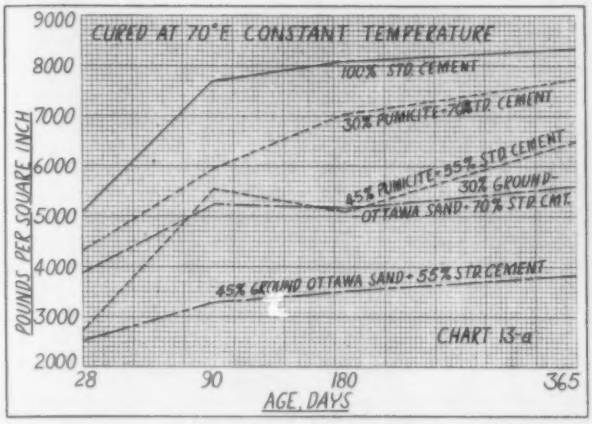
The above results show proportionally more of the R_2O_3 has been rendered soluble than the silica as measured by this method. The increase in the ratios of SiO_2 to R_2O_3 for the Friant pumicite and alusite was approximately the same, in spite of the fact that the alusite contained a much greater percentage of R_2O_3. For the pumicite the R_2O_3 group decreased 47.07 percent and the alusite 32.76 percent. The SiO_2 for both the pumicite and alusite showed an increase in the autoclaved sample. This increase amounted to 8.98 percent for the pumicite and 31.11 percent for the alusite.

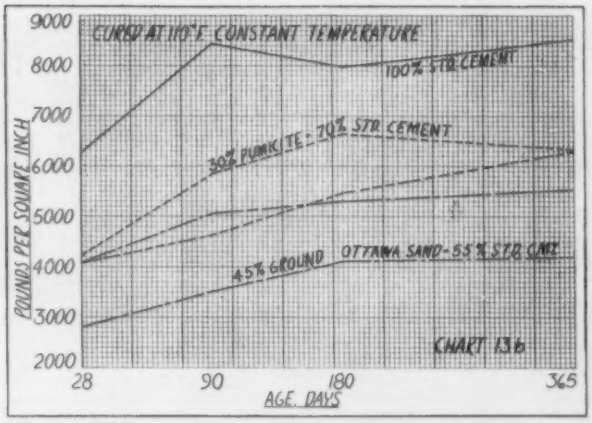
The above data concerning the relative greater activity of the R_2O_3 group is interesting. As this detail was merely the result of curiosity, we felt that to continue the study of the R_2O_3 group would lead us away from the purpose of our original study.

The results from the work done with the autoclave were very interesting to us and also informative for determining maximum amounts of puzzolan that would react with both lime and portland cements under maximum acceleration conditions of curing (high pressures and temperature with a saturated atmosphere). These accelerated curing conditions would hardly be applicable for anticipating activity under field conditions where

TABLE 12: DETERMINING INSOLUBLE RESIDUES OF PORTLAND CEMENT-PUZZOLAN MIXTURES

Cement	Puzzolan	Initial Insoluble	Autoclave Insoluble	Soluble	Days	% Insoluble Residue for Time and Temperature 70°F.	110°F.	150°F.	212°F.
70% Modified	30% Friant Pumicite	27.64	0.78	26.86	28	25.80	19.08	16.29	11.03
				26.86	90	23.44	18.21	14.35	7.99
				26.86	180	20.82	17.61	10.91	6.99
				26.86	365	17.38	16.03	8.92	4.93
55% Modified	45% Friant Pumicite	41.20	11.49	29.71	28	39.88	32.99	31.47	28.75
				29.71	90	36.86	31.02	28.47	20.16
				29.71	180	34.63	30.66	29.05	17.33
				29.71	365	30.89	29.38	20.07	16.59
70% Modified	30% Ground Ottawa Sand	29.97	8.37	21.60	28	29.84	29.02	26.11	14.03
				21.60	90	29.71	28.83	22.34	11.87
				21.60	180	29.50	.	.	11.60
				21.60	365	25.97	.	.	11.02
55% Modified	45% Ground Ottawa Sand	43.60	18.74	24.86	28	43.38	43.04	37.87	26.27
				24.86	90	43.33	41.96	29.14	23.73
				24.86	180	43.03	40.80	24.54	21.62
				24.86	365	39.99	38.34	22.57	21.10





Charts 13a and 13b: Compressive strength of different mortars cured at 70 and 110 deg. F. constant temperatures

curing progresses under much lower pressures and temperatures.

To measure the activity of puzzolans with portland cement for time at various temperatures, we arranged a similar test as carried out with the lime-puzzolan mixtures (See Table 4).

As in the lime-puzzolan tests, the specimens were mixed with a definite percentage of puzzolan and cement, gauged with 40 percent of water and stored in metal sealed containers at 70 deg. F., 110 deg. F., 150 deg. F., and 212 deg. F. for varying lengths of time. At each period an insoluble determination was made on each specimen. These results are shown in Table 12 on the preceding page.

The "Initial insolubles" were determined in each case by analysis of each prepared mixture. The "autoclaved insolubles" are the results after two five-hour periods of autoclaving at 300 lb. pressure. An intervening pulverizing (mortar and pestle) was made before the second autoclaving.

It is to be noted that the "soluble" increases with higher percentage additions of the puzzolan. This is not unreasonable when it is considered that both the hydration of the cement and absorption of the lime in solution by the particles of puzzolan are both surface reactions, and it is only reasonable to expect that with a higher percentage of puzzolan available for surface reaction with lime in solution, that slightly more will react.

The results of Table 12 are shown in Table 13 in terms of percentage completion of activity, together with compressive strengths. The percentage "reactive" was determined, calculated and expressed the same as shown in Table 6.

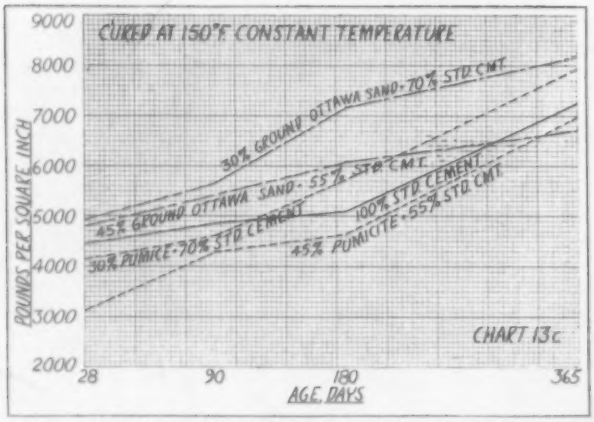
The mortars are a 1:2.75 mix, using a local concrete sand. The mixing water was added to give a definite flow for all mixes. The strength specimens were cast in 2- x 4-in. sealed metal containers. As a precautionary measure the 2- x 4-in. specimens were placed in one gallon friction top cans partly filled with water and sealed to insure a moist curing atmosphere. The specimens were stored at the designated temperatures and tested at the periods shown.

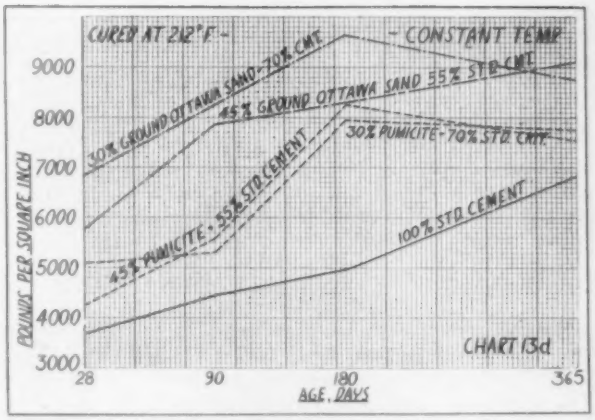
The compressive results for 28, 90, 180 and 365 days, at constant temperature for each design shown in Table 13 are graphically illustrated by charts 13-a, b, c, d, showing strength gain with time at 70 deg. F., 110 deg. F., 150 deg. F., and 212 deg. F., respectively.

It is to be noted at 70 deg. F. and 110 deg. F., the 100 percent portland cement mortar strength leads the portland-puzzolan cement mortars at all periods. This seeming strength advantage is in the reverse order at temperatures above 110 deg. F. At temperatures between 110 deg. F. and 150 deg. F. (as shown by our results at 150 deg. F.), the 100 percent portland cement mortar has lost the strength advantage it held at 70 deg. F. and 100 deg. F. It is also to be noted that the strength gain from 110 deg. F. to 150 deg. F. for the portland-puzzolan made from ground Ottawa sand is much greater than the portland-puzzolan made from pumicite.

RESULTS OF INSOLUBLE RESIDUE DETERMINATIONS IN TERMS OF PERCENTAGES OF PUZZOLAN ACTIVITY AND COMPRESSIVE STRENGTH

TABLE 13: Cement		Puzzolan		Mortars Sand	W/C By Wt.	Days	70 deg. F. P.S.I.	70 deg. F. Reactive	110 deg. F. P.S.I.	110 deg. F. Reactive	150 deg. F. P.S.I.	150 deg. F. Reactive	212 deg. F. P.S.I.	212 deg. F. Reactive
Mod.	100%	None		1:2.75	.562	28	5156		6302		4488		3724	
Mod.		None		1:2.75	.562	90	7735		8435		4870		4488	
Mod.		None		1:2.75	.562	180	8117		7990		5093		4998	
Mod.		None		1:2.75	.562	365	8339		8530		7276		6812	
Mod.	70%	Pumicite	30%	1:2.75	.571	28	4376	6.85%	4310	31.87%	4169	42.26%	5092	61.84%
Mod.	70%	Pumicite	30%	1:2.75	.571	90	5982	15.64%	5825	35.11%	4647	49.49%	5347	73.19%
Mod.	70%	Pumicite	30%	1:2.75	.571	180	7066	25.39%	6684	37.34%	5762	62.29%	7958	76.88%
Mod.	70%	Pumicite	30%	1:2.75	.571	365	7763	38.20%	6363	43.22%	7958	69.69%	7763	84.55%
Mod.	55%	Pumicite	45%	1:2.75	.596	28	2760	4.44%	4138	27.63%	3183	32.75%	4249	41.90%
Mod.	55%	Pumicite	45%	1:2.75	.596	90	5555	14.61%	4679	34.26%	4297	42.85%	5602	70.85%
Mod.	55%	Pumicite	45%	1:2.75	.596	180	5093	22.11%	5507	35.48%	4647	40.89%	8276	80.35%
Mod.	55%	Pumicite	45%	1:2.75	.596	365	6494	34.70%	6303	39.78%	7003	71.12%	7576	82.82%
Mod.	70%	Grd. Ottawa	30%	1:2.75	.571	28	3883	.60%	4138	4.40%	4934	17.87%	6844	73.80%
Mod.	70%	Grd. Ottawa	30%	1:2.75	.571	90	5252	1.21%	5093	5.28%	5666	35.32%	8276	83.80%
Mod.	70%	Grd. Ottawa	30%	1:2.75	.571	180	5157	2.18%	5347	.	7194	.	9704	85.09%
Mod.	70%	Grd. Ottawa	30%	1:2.75	.571	365	5602	18.53%	5539	.	8212	.	8753	87.71%
Mod.	55%	Grd. Ottawa	45%	1:2.75	.597	28	2515	0.88	2865	2.25%	4807	23.05%	5762	69.71%
Mod.	55%	Grd. Ottawa	45%	1:2.75	.597	90	3310	1.10	3550	6.60%	..	58.16%	7830	79.93%
Mod.	55%	Grd. Ottawa	45%	1:2.75	.597	180	3549	2.30	4170	11.26%	6111	76.67%	..	88.42%
Mod.	55%	Grd. Ottawa	45%	1:2.75	.597	365	3852	14.54	4265	21.16%	6716	84.58%	9135	90.52%


CURED AT 150°F CONSTANT TEMPERATURE
30% GROUND OTTAWA SAND-70% STD CMT
45% GROUND OTTAWA SAND-55% STD CMT
30% PUMICITE-70% STD CEMENT
100% STD CEMENT
45% PUMICITE-55% STD CMT
CHART 13c
POUNDS PER SQUARE INCH
AGE, DAYS


CURED AT 212°F - CONSTANT TEMP
30% GROUND OTTAWA SAND-70% CMT
45% GROUND OTTAWA SAND 55% STD CMT
30% PUMICITE-70% STD CMT
45% PUMICITE-55% STD CEMENT
100% STD CEMENT
CHART 13d
POUNDS PER SQUARE INCH
AGE, DAYS

Charts 13c and 13d: Compressive strength of different mortars cured at 150 and 212 deg. F. constant temperatures

At 212 deg. F. the 100 percent portland cement mortar strength has been exceeded by all of the portland-puzzolans. Of the two portland-puzzolans, the ground Ottawa sand has higher strengths. By contrast, the strength results of the pumicite portland-puzzolan at 70 deg. F. and 110 deg. F. exceed the ground Ottawa portland-puzzolan.

Parallel specimens of all of the above mortar designs were autoclaved for strength after curing 24 hours at 70 deg. F. The results are tabulated in Table 14. The sealed specimens were autoclaved continuously at two pressures. The first pressure is 100 lb. for 24 hours and the pressure is then raised to 300 lb. and held for 6 hours.

TABLE 14: AUTOCLAVE STRENGTH TESTS

Cement	Puzzolan	Autoclave Strength P.S.I.
100%	None	4536
70%	30% Pumicite	6494
55%	45% Pumicite	5650
70%	30% Ground Ottawa Sand	7623
55%	45% Ground Ottawa Sand	8308
70%	30% Ground Alusite	4616
55%	45% Ground Alusite	3756

Here again it is to be noted at high temperature curing the 100 percent portland cement mortar strength is low. Portland - puzzolan made from ground Ottawa sand exceeds in strength the portland-puzzolan made from pumicite. These results conform with previous results obtained at 212 deg. F. for longer periods of time and detailed in Table 13.

The portland-puzzolan made from ground alusite shows low strengths at high temperatures.

The above information shows a method for selecting a type of puzzolan for a particular purpose. For thin slab, stucco or ordinary structures where heat loss by radiation is high, a puzzolan having a high reactive rate at normal temperatures may be preferred. A puzzolan having a high reactive rate at normal temperatures will correct or lessen unsightly "bloom." For mass concrete, such as dams where higher than normal curing temperatures prevail, puzzolans having a low reactive rate at normal temperatures but increasing with temperature may be preferred for ultimate strength.

Consideration of the fineness detail for a puzzolan should not be overlooked. To show this, a coarse and fine puzzolan (pumicite) of the same chemical composition was compared for "reactivity" using the same cement. The fineness of the coarse and fine pumicite was 76.0 percent and 98.0 percent minus the 325 mesh. Table 15 shows the comparison and Chart 15A shows the results graphically.

Commenting on Table 15 and 15A, the fine pumicite "reactivity" exceeds the coarse pumicite for all comparative temperatures. After 28 days the 70 deg. F. fine pumicite exceeds the coarse pumicite even at 150 deg. F. At 110 deg. F. the seven-day fine pumicite has a "reactive" rate equal to 99 days for the coarse pumicite at 110 deg. F., 81 days at 150 deg. F. and 37 days at 212 deg. F.

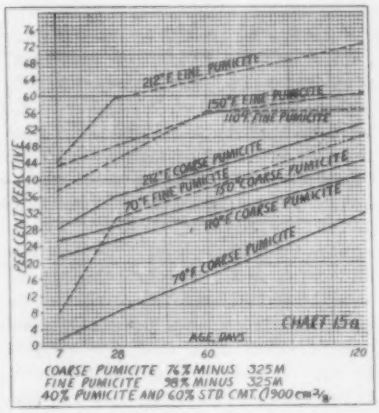


Chart 15a: Graphical interpretation of Table 15

TABLE 15: EFFECT OF PUZZOLAN FINENESS

Curing Time Days	% Std. Cement	% Pumicite	Pumicite Fineness	% Reactive at 70 deg. F.	% Reactive at 110 deg. F.	% Reactive at 150 deg. F.	% Reactive at 212 deg. F.
7	60% Std. 1900 sq. cm. per gr.	40%	76%-325M	1.83	21.70	25.59	28.2
28	1900 sq. cm. per gr.	40%	76%-325M	8.25	25.70	29.0	36.3
60	1900 sq. cm. per gr.	40%	76%-325M	...	...	...	...
120	1900 sq. cm. per gr.	40%	76%-325M	31.90	41.23	44.6	53.2
7	60% Std. 1900 sq. cm. per gr.	40%	98%-325M	8.03	37.70	43.6	44.8
28	1900 sq. cm. per gr.	40%	98%-325M	31.08	...	...	59.2
60	1900 sq. cm. per gr.	40%	98%-325M	...	56.04	55.9	...
120	1900 sq. cm. per gr.	40%	98%-325M	50.70	56.70	60.5	72.3

Summary

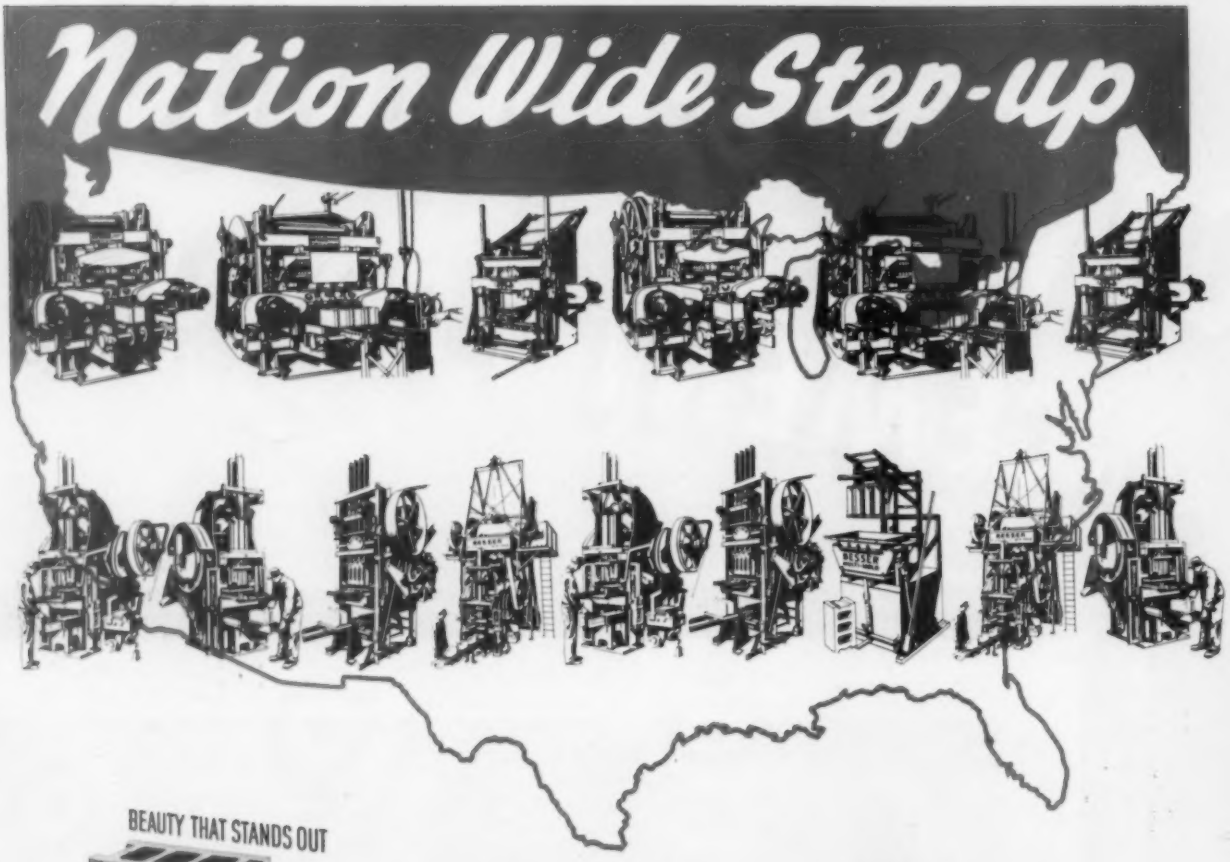
The lowered strengths at the early periods for portland-puzzolan cement mortars and concretes when normal curing temperatures prevail can be decidedly improved by increasing the fineness of the cement. It is possible in many cases to accomplish this increased surface area of the cement at a saving when the puzzolan displacement offsets the increased grinding cost.

(Continued on page 87)

CONCRETE PRODUCTS AND CEMENT PRODUCTS

New Carillon Tower, University of Michigan. Jolterete blocks furnished by L. G. Randolph, Ann Arbor, Mich.

Nation Wide Step-up



Smooth, even top and straight, sharp edges

The first vibration method used to make blocks commercially

FULL SPEED AHEAD

- All records for production of concrete masonry units were broken during the past year. New standards of quality and wider ranges of use for concrete masonry were established. There was far better and more general recognition of the advantages and economies of concrete construction.
- All records of purchases of Besser Plain Pallet Strippers were broken. Plain Pallets—Fully Pressed Top—Heavy Tamping—Undirectional Vibration—all received fuller recognition which these Exclusive Besser Features merited.
- The past year was the greatest in Besser history in the development and improvement of machines to produce blocks that excel any ever known for beauty, quality, texture and strength. In addition, still further economies of operation and production, *so vital to profits*, were achieved.
- Besser Plain Pallet Vibrapacs and Tampers are operating throughout the country from coast to coast—in West Indies, Canal Zone, Hawaii and South America. One or two Bessers installed and then a third, fourth, fifth and sixth operating at full capacity carrying out speed, quality and economy programs.
- All this means there is no time to lose in getting ready for the biggest year ahead ever known for the concrete products industry.
- The Besser Organization, backed by more than a third of a century's continuous experience is at your service with the most complete and most highly perfected line of concrete machinery ever before offered.

Write today for information, fully illustrated literature and advisory engineering service without obligation on your part.

Besser Manufacturing Company

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

203 41ST STREET — ALPENA, MICHIGAN

THE SAVING IN PALLET COST WILL PAY FOR ANY BESSER PLAIN PALLET STRIPPER

Seeking Larger Share of Building Market

National Concrete Masonry convention in Chicago discusses new types of concrete floor systems, manufacturing, and ways and means of getting a bigger share of the construction dollar

John S. Chase, Chase Building Products, Inc., new president of the N.C.M.A.

CONCRETE MASONRY manufacturers had the biggest year in their history during 1940, and followed it with their most enthusiastic annual convention. The National Concrete Masonry Association met at the Sherman hotel, February 10-12, simultaneously with the conventions of the American Concrete Contractors Association, the American Concrete Pipe Association, the Cast Stone Institute, Sand-Lime Brick Association and the National Cinder Concrete Products Association.

Attendance was well over 3000, of which an estimated 1000 were concrete masonry producers, representing possibly 600 to 700 companies.

Machinery displays, in the Concrete Industries Exposition, topped all previous exhibits, in numbers and in the interest shown. Since this was the first machinery display in two years, there had been a lot of progress in machinery design and in the development of new equipment and accessories.

New Officers

JOHN S. CHASE, Chase Building Products, Inc., Fort Worth, Texas, was elected president of N.C.M.A. to succeed Roy N. McCandless, Cinder Block, Inc., Detroit, Mich., who will serve as chairman of the board of directors for 1941. Vice-presidents are John L. Strandberg, Kansas City, Mo.; Walter Manhardt, Milwaukee, Wis., and H. H. Longenecker, Philadelphia, Penn. Fred W. Reinhold, Buffalo, N. Y., was elected secretary-treasurer, and E. W. Dienhart was re-elected assistant secretary.

The complete board of directors includes John S. Chase, Fort Worth, Texas; W. J. Manhardt, Milwaukee, Wis.; John L. Strandberg, Kansas City, Mo.; Fred W. Reinhold, Buffalo, N. Y.; M. W. Ferguson, Roanoke, Va.; Horace W. Bush, East Orange, N. J.; H. H. Longenecker, Philadelphia, Penn.; Ray A. Berger, Detroit, Mich.; Roy N. McCandless, Detroit, Mich.; and a new member, Harold Spaight, Cedar Rapids Block Co., Cedar Rapids, Iowa.

ROY MCCANDLESS opened the formal convention sessions by reviewing the progress made by the industry and the activities of the Association, and concluded by outlining work which should be undertaken. The year 1940 ended with the greatest sales volume in the history of the industry, he said, and with the development of new methods and far greater public acceptance for concrete masonry. Concrete masonry sales exceeded those of 1929 even though the year 1929 was blessed with more construction which, he said, is an indicator of progress being made at the expense of competitive materials. During these two years, Mr. McCandless said there was a decided decrease in clay product sales.

Membership has increased to about 250 in all designations. There is a need for a revival of the publication, "Facts About Concrete Masonry," which will be made available for sale to member concerns. Research work in 1941 will involve two major studies; study of problems in connection with cement paints and their application, and the study of precast concrete floor construction.

Other features of the convention, aside from business sessions, were the annual banquet, a complimentary stag smoker, and the showing of movies having popular and educational interest. One of the movies showed the actual collapse of the suspension bridge at Tacoma, Wash., with comments extemporaneously from F. R. Zaugg, Concrete Masonry Units Co., Tacoma. Another film of the Pennsylvania Turnpike construction also was shown.

H. B. DAVIDSON, Meredith Publishing Co., Chicago, Ill., in a paper, "How *Better Homes and Gardens'* Bildcost Plan Service Features Concrete Houses," analyzed the market for small home construction and offered some ideas on how to win more of these homes for concrete masonry.

Better Homes and Gardens, with a circulation of 2,000,000 readers, has been making a very exhaustive study of the housing situation.

Suburban home building has doubled in the last few years, he said, and there has been a proportionate shrinkage in the large city populations. The trend is definitely toward

C. E. Eble, Cleveland Builders Supply Co., Cleveland, Ohio, was accompanied to the convention by Mrs. Eble and other members of the family

From top to bottom: 1—"Dick" Carpenter, Portland Cement Association, Buffalo, N. Y., might be embarassed by this picture but he was not the only one who received a flower from the young lady. 2—J. L. Alloway, Lexington Concrete Products Co., Lexington, Ky., right, with a friend from his home town. 3—Jack Crabbs, Austin Crabbs, Inc., Davenport, Iowa, watching a machine in action. 4—F. H. Smikel, Lehigh Portland Cement Co., Chicago, right, is startled and Chas. Gatake is enjoying the situation. 5—Peter Rutten, Ralloc Co., Plainfield, Ill., left, in a huddle with F. H. Anderson, Monarch Machine & Stamping Co., Des Moines, Iowa

lower costs, which are available outside metropolitan areas.

Rising Market for Homes

A chart was shown that traced the cycles of home-building for over 100 years. Peaks and depressions followed definite periods, with a probable peak in 1943. The period leading up to this peak and declining from it for several years would include several years of above normal volume. Home construction in 1940 exceeded that of 1929 by 36,000 units, and was 92 percent greater than in 1934. The number of homes built in 1940 was 545,000, with a probable 660,000 to be built in 1941, according to the chart. There are 29,000,000 buildings in the United States, said Mr. Davidson, of which 3,000,000 are obsolete and 16,000,000 badly in need of repair.

SANFORD COATS, Portland Cement Association, Kansas City, Mo., outlined the steps taken to develop acceptance for concrete houses in his territory in a talk, "Progress in Concrete House Construction in the Kansas City Market." Promotion of concrete houses in Kansas City was started four years ago by the P.C.A. after completion of a survey on the market possibilities, with the help of F. W. Dodge reports and building permits.

It was found that 55 percent of the building was done by operative builders and that these builders comprised 84 percent of the total in Kansas City. More than one-half of the houses cost $6,000 or less and each builder handled six to twelve houses a year.

It proved fairly easy to sell the architects, who represented only 16 percent, but it was necessary to sell the operative builder in order to develop any volume. Four steps were needed to do this. It was necessary to sell the builder on concrete houses, to work with and instruct him, to help him in financing concrete houses and to help create consumer acceptance.

Financing Through Banks

It was not difficult to sell the builder on the merit of concrete houses, but special effort was needed to get him to build them. Most of the builders were carpenters. It was necessary to hold meetings and go over plans with them. It was considered essential that the builder make a profit on his first concrete house and that his natural tendency to overdesign the house be discouraged.

Financing had previously been done through the lumber yards so it was necessary to get the builder to finance himself in other ways. This was done through the local banks. Consumer acceptance was gained through cooperative effort, using newspaper advertisements, publicity stories on houses, exhibits at home shows and State fairs and booklets. Exhibits showed details of construction and featured sloping roofs as a contrast to the conception that concrete homes must have flat roofs.

Demonstration houses proved effective. The practice is to advertise such houses and to invite builders to come. Builders were impressed by the public response and interest shown by the public. Demonstration houses are more effective when handled in coöperation with operative builders because of the followup organization that is then available. Concrete house construction has doubled in Kansas City and 124 units were completed in 1940, despite the lack of any large housing projects.

Capturing Back-Up Market

E. W. DIENHART, assistant secretary, National Concrete Masonry Association, encouraged concrete masonry producers to find new business rather than to fight each other, in a talk, "Capturing the Market for Backup of Brick in the Residential Field." He suggested that backup behind brick veneer is the best immediate opportunity for an enlarged market.

Several instances were mentioned where much progress has been made in promoting concrete masonry backup to brick. Sam Williamson, Media Concrete Products Co., Media, Penn., sold 1500 house jobs last year in the Philadelphia area. Each job averaged 800 concrete block, making a total of 1,200,000 units sold from one plant, without competing with other concrete block manufacturers. Chicago Insulcrete Co., Forest Park, Ill., sold backup for 600 houses in 1940 and progress also has been made in St. Louis, said Mr. Dienhart. Several members were asked to tell their experiences in selling backup for homes.

LOUIS GELBMAN, New York City, said his concern was too busy to promote the smaller structures as several large buildings were under construction. However, residential promotional work will soon be carried forward in Westchester county. A Boston manu-

facturer of concrete products told of an attempt being made to rule out cinder block and of a union's attempt to require two men to place a block in a wall.

Architect Likes Concrete Products

FRANK BARBER, architect, Knoxville, Tenn., gave some good suggestions on the use of concrete masonry from the buyer's point of view, and proved to be a concrete products enthusiast. Title of his talk was, "An Architect Who Uses Concrete Masonry Units and Precast Concrete Floors Gives His Experience."

He first got acquainted with cinder block from J. W. Warren, Southern Cast Stone Co., Knoxville, who took him to Detroit to see how effectively cinder block were being used in theatres, schools, homes and other buildings in other parts of the country. Mr. Warren previously had been exclusively a manufacturer of cast stone and was seeking new markets during the depression. Now Mr. Barber uses cinder block for exterior and interior construction and Superock floors and slabs.

He suggested that more attention be given to workmanship in laying up concrete block walls, since good appearance of the finished job is absolutely necessary for more sales. He thinks it would be a good idea for the concrete products manufacturer to coöperate with the architect in the training and hiring of a good blocklayer in every town and city. Good units, properly placed, need no coverup, in his opinion. Concrete block have so many advantages over lumber, he said, that it is unnecessary to sell on price.

Concrete Masonry in the Defense Program

W. G. KAISER, manager, Cement Products Bureau, Portland Cement Association, Chicago, spoke on "Opportunities for Concrete Masonry in the Defense Program," in the absence of David Wright. Part of Mr. Kaiser's talk was on the breakdown of defense construction money among the various governmental agencies and on how to get in on some of the housing construction in connection with the defense program.

At first, he said, lumber was used almost exclusively in housing construction, but now concrete masonry is being used to a considerable degree. Rising lumber prices is one important factor. Government officials have been studying defense housing abroad, and now are favoring more permanent, firesafe construction. It is believed that defense housing may develop into the use of smaller units and more of them.

Some of the reasons for losing jobs to competitive materials were the use of indefinite specifications and quotations solely on a price basis because high priced construction frills were included in concrete masonry specifications, where they were unnecessary in that type of construction. Floor plans and specifications have since been developed that will aid in the adoption of concrete masonry. The Portland Cement Association through its district offices has furnished names of concrete products concerns to Washington agencies to acquaint government officials with sources of supply.

Procedure to be followed in getting defense orders consists of getting an approved large contractor to submit a bid for concrete masonry. This contractor must be registered with the governing federal agency, he must submit a complete breakdown of costs, prove his ability to complete the project on time and must have available the necessary masons.

Cinder Products Manufacturers Form Organization

AN IMPORTANT DECISION was taken by the convention of the National Cinder Concrete Products Association at its recent meeting in Chicago. A resolution was adopted that the report of the Board of Directors be accepted, authorizing the employment of a permanent paid secretary with an office in Washington, D. C. It was further agreed that the minimum annual dues would be $50 for all plants having less than $100,000 sales, based on delivered prices, and that rates would be progressively higher, based on ¼ of 1 percent of sales over $100,000. It was estimated that $18,000 annually would be required.

The annual meeting was tentatively scheduled for Atlantic City, N. J., August 4, 5, and 6. President George W. Goelitzer, Cinder Concrete Products, Inc., Kansas City, Mo., presided. Alden C. McGuire, Comac Builders Supply Corp., Rochester, N. Y., acted as chairman of the meeting, and Harry H. Longenecker, Penn Building Block Co., Inc., Philadelphia, Penn., secretary, presented the resolution.

Top to bottom: 6—G. M. Hackett, Watertown, Wis. 7—John Strandberg, Kansas City, Mo., even promotes concrete masonry at the show. 8—G. O. Green, The Superock Co., Birmingham, Ala., left, and George McDearmon, Baton Rouge, La., swapping stories. 9—Bill Ketchin, Fort Lauderdale, Fla., right, studies facing materials in one of the exhibits. 10—Elmer Strong, LaCross, Wis., stops at Rock Products booth

Floors Offer Big Market

FLOORS are considered the greatest undeveloped market for concrete products. Owing to the importance of this growing market a joint meeting of contractors and concrete products manufacturers was held, and a selected list of manufacturers active

F. R. Zaugg, Concrete Masonry Units Co., Tacoma, Wash.

in this field described a number of concrete floor systems and the extent to which the markets have been cultivated.

Manufacturing Method

L. M. UPCHURCH, Hoke Concrete Works, Raeford, N. C., told of his experiences in introducing Stonex floors, comprising precast slabs superimposed on precast joists, which are manufactured under license from Stonex Industries, Miami Beach, Fla. When Mr. Upchurch started in the business, the state of N. Carolina was not sold on concrete for residential construction but he is now operating his plant at full capacity.

Joists are spaced on 24-in. centers, and the slabs, each weighing 80 lb., measure 24- x 24-in. with a 2-in. thickness. Reinforcing consists of a 4- x 4-in. mesh of No. 10 wire. Rubber suction cups are used in handling slabs, and a grout of white cement mortar is placed between slabs. Slabs are molded by vibration and are available in a variety of colors. Culled slabs have a market for patios and flower gardens.

Ashlar Floor Designs

W. M. KETCHIN, Ketchin Brick and Tile Co., Fort Lauderdale, Fla., a Stonex licensee, manufactures similar units but in addition makes a colored tile. These are available in 6- x 6-, 6- x 12- and 12- x 12-in. sizes, and are ordinarily superimposed over a floor of plain 24- x 24-in. slabs, for ashlar effect.

In addition to residential floors, slabs are furnished for mantels, stairway treads and risers and for store fronts. Floors are now being laid in a large hotel. Because of poor workmanship in installation, the company has found it necessary to do its own erection. This plan has worked out much more satisfactorily, particularly when cutting is necessary or when changes are made in plans and specifications after the job has started. It has been necessary to teach first class bricklayers how to properly lay up the slabs. The finished floor is sold at 60c per sq. ft. at Fort Lauderdale, and 35c per running foot for base board. Two cents is added to the finished floor square foot price for jobs in Miami, which is a distance of 25 miles. Plain floors are 10c less per sq. ft.

Following Mr. Ketchin's discussion, his son Bill, who is in charge of production, answered questions from the floor on methods of manufacture. Ricketson mineral colors are used with a minus ¼-in. quartzite aggregate, in the facing. A mottled effect is created in placing the facing in steel molds, by vibration, and the backing is poured 20 to 30 minutes after the facing is placed. Maximum joist spans are 18 ft., with the joist reinforcing contained entirely within the concrete. Steel reinforcing extending outside the joists to tie in with the floor slab would be subject to attack from the salt air in Florida. Nevertheless, some T-beam action is obtained.

Use Own Erecting Crews

C. A. BULLEN, Midwest Concrete Pipe Co., Franklin Park, Ill., described his company's production line for the manufacture of the "Flexicore" floor system. Slides were shown of typical

Part of the floor show at the banquet, singing "God Bless America"

job installations including dairy barns, low cost and expensive residences, factories and bowling alleys. The floor slabs have a 6- x 12-in. rectangular cross-section with two circular cores extending the span length.

This company has its own erecting crews for placing the slabs, using delivery trucks equipped with hoisting apparatus to place the slabs as they are unloaded. (See ROCK PRODUCTS, February, 1941, pp. 71-73.)

JOHN STRANDBERG, Kansas City, Mo., speaking generally on the subject of concrete floors, said that the concrete products industry is now in a favorable position to accelerate sales. One of the reasons for a promising outlook at the present time is the high prices quoted for lumber. Speed of erection, as well as favorable prices, are factors in developing this market, he said, and to this end coöperation with the contractors is essential. In his opinion, it is also desirable to have a fixed, standard price.

HERBERT F. LOUCKS, Madison Silo Co., Madison, Wis., told of his company's initial efforts to develop the concrete floor market, which are still in the early stage. The company manufactures a floor system with concrete joists and either precast or poured-in-place slabs, and also the Postonway slab system. Precast slabs are used largely in roof construction. Much of the promotional work thus far has been educational, dealing with architects, engineers and builders.

Filler Block System For Floors

WALTER MANHARDT, Best Block Co., Milwaukee, Wis., emphasized the need for published engineering data on joist and floor systems, and distribution of this information among architects, engineers and builders. Experienced sales engineers are needed to put it over, he said. The Best Block Co. manufactures a Haydite floor filler block system, providing an ideal plastering surface that does not require the use of metal lath. Floors of this system are furnished for industrial buildings as well as residences, and for live loads as high as 125 lb. per sq. ft. An 8-in. Haydite filler unit weighs only 18 lb.

In 1940, over 250,000 units were sold, for schools, hospitals, churches, hotels, department stores, packing plants and other types of buildings. Following Mr. Manhardt's talk, Walter Sherman, engineer, Milwaukee, showed some of the engineering data he had developed in his research on concrete floors and some slides of jobs furnished in his locality.

FRED REINHOLD, Buffalo, N. Y., said his experience had been that roof and

floor systems cannot be put over as a sideline business. This approach had been tried with little success, until a push was put behind it in recent years. A structural engineer was engaged to work on design, testing and sales promotion, and concrete floors have been given the full support of the concrete block sales department. Mr. Reinhold is now getting fine results. Four steps were mentioned as essential to the successful promotion of concrete floors. These are to hire an engineer, to have full-time salesmen, to consider floors as more than a sideline business and to allow room in the plant for expansion.

J. W. Warren, Southern Cast Stone Co., Knoxville, Tenn., has been very successful in the promotion of Superock joists with poured slabs. Slides of outstanding jobs were shown by Mr. Warren who emphasized that low insurance rates on houses having concrete floors are a good selling point. Insurance rates as low as 11c per $100 have been quoted for homes of that type of construction in the Knoxville section.

Concrete Compares Favorably With Wood on Cost Basis

Harold B. Hemb, Chicago, Ill., made a comparative cost analysis of concrete floors as against wood floors on a square foot basis that showed concrete not to be at a disadvantage. Ordinarily, comparative figures do not take into consideration certain cost factors essential to the completed house which are not necessary when concrete floors are used and for which credit should be given. In his cost analysis, Mr. Hemb showed figures to prove that concrete floors are cheaper than wood in some cases where plastering costs, etc., boosted the price. He believes an analysis of cost figures is a good sales point to architects.

Ralph Condo, Somerville, N. J., described the "Leesch" System of precast reinforced concrete floor and roof construction. The shape of the unit is like a "T" and lengths up to 20 ft. are specified. Units are placed in either the upright or inverted position for various types of construction. It serves as floor, ceiling or roof, and is adaptable for small bridge or culvert construction. This system, which is readily adaptable to plastering and the application of other flooring, is delivered and placed at 45c per sq. ft. of floor.

A family group at the convention. Left to right, Chas. Gatzke, Des Plaines Concrete Products Co., and Mr. and Mrs. R. J. Seidel, Des Plaines, Ill. Mrs. Seidel is the daughter of Mr. Gatzke, and has been brought up in a "concrete" atmosphere. The couple are to relieve Mr. Gatzke of some of the duties of managing the business starting this Spring

Market for Floors Equals That for Walls

Donald C. Wood, Syracuse, N. Y., uses a precast joist-filler tile system which may be installed in low cost and expensive dwellings as well as in hospitals and other structures. The tile are set between joists and supported by the flanges. An 8-in. joist is made up to 16-ft. clear span and a 10-in. up to 20 ft. Joist spacings range from 16 to 30 in. apart, thereby making provision for six spacings of joists. The system costs 60c to 65c per sq. ft. of floor, including the placing of the floor and hard oak flooring ready for the furniture.

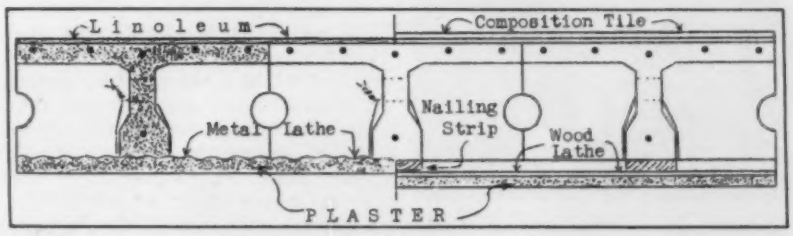
Charles W. Akers, Nashville, Tenn., spoke briefly on the available untapped market in concrete floors of all types and the methods to promote them.

Mr. Akers called attention to the fact that in a 30- x 30-ft. house there are as many square feet of floor as there are of walls, which means that only half of the market for concrete masonry is being realized when the walls alone are sold. On the basis of 500,000 houses built in one year, Mr. Akers assumed that if 200,000 of them had concrete floors, this would represent an annual market of $100,000,000 to shoot at for floors alone.

Otto Formigli, Philadelphia, Penn., who has been successful in selling precast joists for industrial and other big buildings, suggested that this market affords a volume opportunity that should not be overlooked. For every foot of joist sold in residences there are 25 ft. available in large construction. His first attempt to introduce concrete joists was unsuccessful because he failed to sell the home owner. In 1940, a single housing project utilized 43 miles of precast concrete joists in Philadelphia.

W. G. Kaiser concluded the session on concrete joists and floors by stating that ten percent of the houses built in 1940 had at least part concrete construction. In 1938 there were 5419 houses in this classification, in 1939 there were 31,963, and 42,935 in 1940. Concrete floors increased from 6,250,000 sq. ft. in 1938 to 27,750,000 in 1939 and 36,500,000 in 1940.

He believes that all the floor systems discussed have merit, and that this variety is as necessary as a number of automobile types have been to the introduction and improvement of that vehicle. Coöperation is needed between the manufacturer of floor units and the contractor, and beauty in appearance is necessary to put it over, said Mr. Kaiser.



"Leesch System" for concrete floors and roofs in the T position, where the flanges become the solid concrete floor ready for the application of various types of finishes

Ideas for Better Joists

PRECAST CONCRETE JOIST manufacturers held a separate meeting for an interchange of ideas on manufacturing and promoting the sale of concrete joists. This session was largely taken up with production methods, engineering design, and operating details which improve the finished joist.

In discussing curing, Otto Formigli, Philadelphia, Penn., said that he uses a combination of steam, for heat, and graduated nozzles which release a moisture fog into the kilns. He also brought up the subject of deflections. K. C. Tippy, P.C.A., Chicago, said that deflections as much as ½ in. are to be expected in 24-ft. span joists. It was also pointed out that wood floors deflect more than concrete floors with joists, causing cracks in the plastering and walls. Mr. Tippy believes it would be a good selling point to emphasize that precast concrete joists and slabs provide T-beam action and are therefore much more satisfactory in that respect.

Regarding shrinkage cracks that occasionally occur in the joists themselves, he suggested the use of a drier concrete mix as a solution. Denser mixes can be placed with satisfactory results, he said, by filling the molds in two courses. Vibration would then be applied after two-thirds of the mold is filled and again when the mold is filled to the top.

Air bubbles forming along the sides of the joists have been troublesome to some manufacturers. Mr. Tippy suggested, as a solution, that oil on the forms be changed more often. He also suggested experimenting with a mixture of paraffin and crank case oil. One manufacturer uses a form oil made of about one-third castor oil and two-thirds kerosene.

It was apparent that bar joists are furnishing more competition to the concrete joists than the wood joists. One manufacturer said that he sells both kinds to eliminate this competion. He is experiencing a shortage of bar joists which it is believed will make easier the sale of concrete joists.

When to Cut Joists?

RALPH CONDO, Somerville, N. J., started a discussion on how large a stock of joists should be carried. The problem is whether a large investment should be tied up in stocks of joists preformed in odd lengths or whether odd sizes should be cut from standard lengths. Where joists are cut to odd lengths, he asked whether other manufacturers are charging prices for the original full length and what was being done with regard to the location of stirrups in cut joists.

Mr. Tippy said that if a 14-ft. joist is reinforced with stirrups according to the recognized design tables, and is cut to 12 ft. there may or may not be an important difference. In many cases, the 12-ft. length might include more stirrups than needed. He suggested that joists be cut from one end only with additional stirrup reinforcing provided in one end of the joists that are likely to be cut.

One manufacturer said that he charges for a 14-ft. joist length when a 12-ft. length is shipped but only when the shorter length cannot be made on order. Another manufacturer advocated the use of high early strength cement to speed up production.

Research and Laboratory Studies

A. L. BOWLING, engineer, Cinder Block, Inc., of Roanoke, Roanoke, Va., spoke on the subject, "The Value of a Laboratory for a Concrete Products Plant," in one of the "clinic" sessions for the discussion of new ideas and methods. Mr. Bowling's company is one of the few that has a complete laboratory for routine tests and for concrete masonry research. Quality control through the elimination of guesswork is one of the valuable functions of this laboratory.

Tests are conducted regularly on the raw materials, and manufacturing process, including the finished product. Cinders are variable in quality and are tested often in order to make proper concrete mix adjustments. These tests include the dry rodded weight test, a float test, one for combustible content and chemical analyses. Every car of cinders is checked for combustibles, and the weight test is made daily. Other daily tests are made on screen analysis, for moisture content and curing temperatures. This plant is equipped for high pressure steam curing.

Five of each type of unit made in any one day are taken as samples, at two hour intervals, for compressive tests, and 6- x 12-in. cylinders are taken as a check on the concrete used in manufacturing lintels and joists.

Dorothy Kramer, The Kramer Corp., Peoria, Ill., only member of the fair sex serving as an active machinery representative at the show

To use Mr. Bowling's own words, it is the plant laboratory's responsibility to catch mistakes before they are made. Cinders are checked before they are unloaded, for example, and faulty units would be detected before they are shipped. By constant testing freight costs are often saved, and even a customer. While few concrete products manufacturers are as fully equipped for testing as the Cinder Block, Inc., of Roanoke,, commercial laboratories are being used more widely.

Specifications

P. M. WOODWORTH, Portland Cement Association, Chicago, Ill., suggested some recommended revisions to standard specifications based principally on the results obtained from the University of Wisconsin tests. To show how much requirements have changed, Mr. Woodworth reviewed all the specifications for concrete masonry, dating back 36 years when a committee was first formed to prepare standards.

The Wisconsin tests developed some new information on weather resistance which can be correlated with compressive strength. A proposal was made to change the requirements (A.S.T.M. C-15) for hollow load-bearing walls exposed to weather. A minimum face shell thickness of 1¼ in. and a compressive strength of 1000 p.s.i. gross area, with a minimum of 900 p.s.i., was suggested. This proposal is to be submitted to all members of N.C.M.A. before taking action.

AUSTIN CRABBS, Austin Crabbs, Inc., Davenport, Iowa, spoke on the subject of unit design. His talk was principally concerned with whether the typical 3-core concrete masonry unit is properly designed. Mr. Crabbs questioned whether or not the 2-core unit would not still be in favor if stripping

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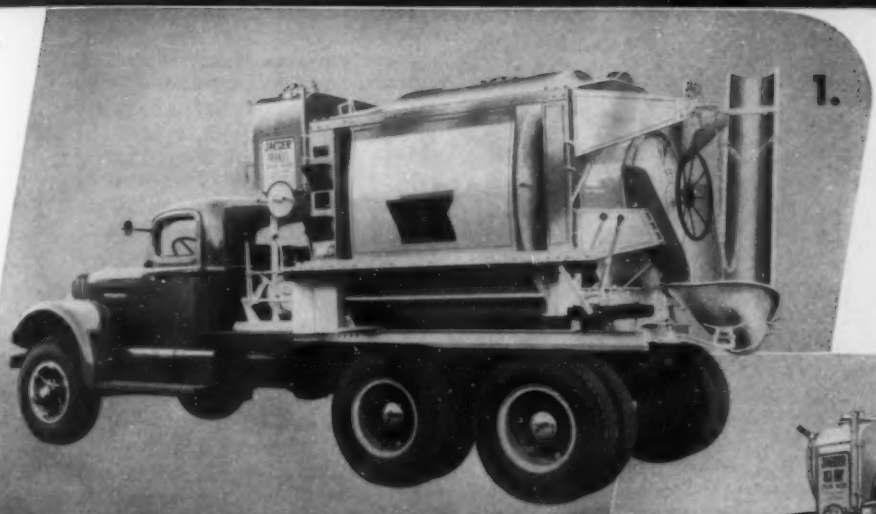

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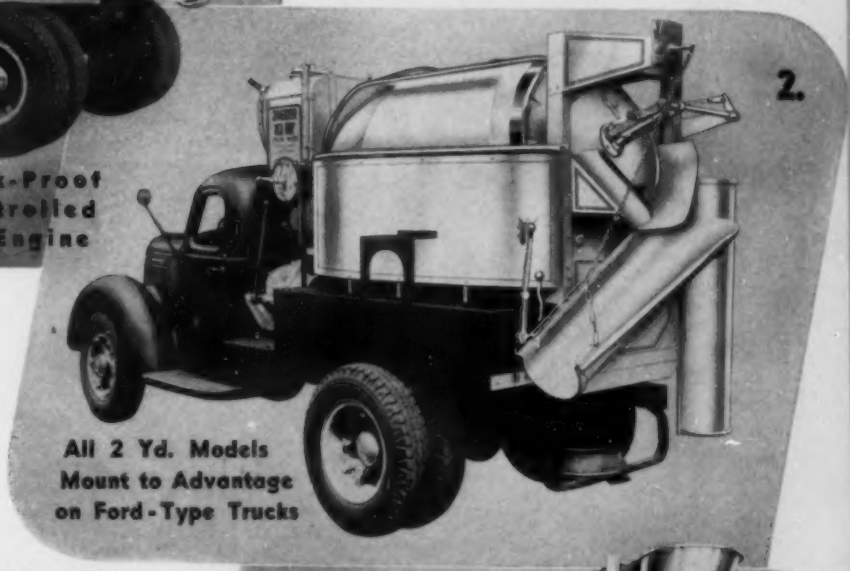

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Some snapshots at the convention. 1—Mr. and Mrs. W. G. Kaiser dropped by the Rock Products booth. 2—At the directors' table, annual banquet, Walter Manhardt, Milwaukee, left, and Ray Berger, Detroit. 3—Herbert F. Loucks, Madison, Wis., center, and Charles Gatzke, Desplaines, Ill., right. 4—V. G. Gearing, Roanoke, Va., left, and Otto Formigli, Philadelphia, Penn., at one of the meetings. 5—Harold Spaight, Cedar Rapids, Iowa, new board member standing in background, and Harve Kilmer, Des Moines, on right. 6—John S. Bailey, Atlanta, Ga., looking 'em over at the show. 7—H. L. Rogers, Price Bros., Inc., Dayton, Ohio, left, and Luther Randolph, Ann Arbor, Mich. 8—B. Olney, East Chicago, Ind., has to be shown how to modernize a wall

machines had come in earlier, inferring that displacement of facedown block machines is one of the principal reasons why 2-core units are outmoded.

His experience is that it is easier to repair vertical cracks in a wall that is built of 2-core units with a center web. Mr. Crabbs suggested that an investigation into unit design might be in order.

J. P. D. Jarvis, P.C.A., pointed out the potentialities of scored masonry units in enlarging markets for concrete masonry units. Scoring of standard units is the means of creating ashlar walls in different patterns, sizes and textures without the inconvenience of making a variety of sizes which are difficult and costly to lay up in a wall.

Scoring can be done by cutting grooves with a power saw, said Mr. Jarvis, or by providing for jointing in the molds. He believes the use of a saw might be preferable since standard units taken from stock can be scored at the rate of two or three per minute. Estimated cost is about 1½c per block for cutting grooves.

Eugene Leipold, Advance Cast Stone Co., Milwaukee, Wis., showed some slides of buildings in Milwaukee built of faced concrete units with scored joints. These units are granite-faced, with the scoring provided for in the molds and they are cast by vibration. A plastic mix is used and the plant produces 1200 standard 8-in. units in an 8-hr. day. The average price is 28½c for 8- x 8- x 16-in. size, which still undersells common brick, said Mr. Leopold.

Harold L. Spaight, Cedar Rapids Block Co., Cedar Rapids, Iowa, showed samples of a new method of reinforcing concrete masonry walls he had developed for use between courses.

This reinforcing, called "Dur-O-Wall," is of ⅛-in. diameter, high tensile steel wire that fits accurately into the mortar bed. A small diameter wire has been found preferable to a heavier wire for ⅜-in. joints, and the method of forming through electric welding is the means of eliminating warping and obtaining accuracy. Dur-O-Wall is made for all wall thicknesses and is offered for sale.

Use Heated Forced Air to Dry Concrete Units

R. E. Copeland, P.C.A., discussed the practicability of drying concrete units through the use of heated forced air as a means of reducing the shrinkage that takes place when a concrete masonry wall drys out. Specifications limit moisture content in a concrete unit to a maximum of 40 percent of the total absorbible water, and it is important to know positively that this requirement is being met.

Mr. Copeland has been experimenting on a sizeable scale to determine the feasibility of accelerating the drying out of units in stockpiles, and displayed some slides showing various methods. Different stockpile arrangements were tried; some with the cores horizontal and some with vertical cores; some with pier blocks under the piles to aid circulation; and some with the units piled closely together and resting on the ground. All the stockpiles were covered with tarpaulins.

In designing the drying equipment, portability, low first cost and operating cost and automatic features were considered desirable. An apparatus was built consisting of an oil burner to generate heat, and an airplane type blower, driven by a 3-hp. motor at 1800 r.p.m., mounted on an old automobile chassis. The burner is located in the air stream, and heated air was injected into the stockpiles. Each stockpile, holding 960 concrete units, contained an average of 70 percent absorbible moisture.

Where the closely-piled units rested on the ground, the moisture content was not reduced to the allowable maximum of 40 percent in 21 days, but likely would have in six weeks. Where the first row of units was elevated above the ground, the normal air drying without application of heat reduced the moisture content sufficiently in only seven days.

In conclusion, Mr. Copeland recom-

mended the use of covered storage with plenty of space provided between stockpiled units for the free circulation of air. Heated air is practicable and economical under unfavorable weather conditions. Cost was 50c per hour for fuel and power, or about ½c per block for eight hours of treatment.

High Pressure Steam Curing

LUTHER RANDOLPH, Ann Arbor, Mich., discussed the practicability of high pressure steam curing for an average sized concrete products plant. Mr. Randolph's plant is the first to make a complete changeover from low pressure steam curing, and he did it principally because he had no room to expand his yard in an industrial section where property values are high.

Other reasons for changing were a desire for a uniform, dry unit having a low shrinkage. Advantages gained were the elimination of a large stockpile; clean, dry units that have been bleached to a lighter color; lintels and specials can be made in a very short time; 80 percent of the units can be taken direct from the kilns to trucks; winter curing hazards have been removed; and there is a sales advantage that can bring a higher unit price than for units cured in other ways.

Mr. Randolph operates two machines and has four curing drums, which have an average capacity of 1000 units each. Steaming is done for an 8-hr. period under 120 p.s.i. pressure. Fuel costs are 0.4c per 8- x 8- x 16-in. block. In a subsequent discussion of costs, Harold Levine, National Brick Co., Long Island, N. Y., estimated that his complete cost is 1½c per block for the curing process.

HERBERT J. VINCENT, Cinder Block, Inc., Detroit, Mich., described various types of joints which are used to effect variety in the appearance of concrete walls, emphasizing the importance of proper tooling on the finished appearance and water impermeability.

GEORGE W. MACNEILL, Chicago Dunbrik Manufacturing Co., Chicago, Ill., told about his concern's marketing efforts that have gained the acceptance of 200 builders, with only two years in the business. Briefly, he said that it was not a case of selling brick but in promoting its use.

Milwaukee Contractors Use Ready Mix Concrete

AT the American Concrete Contractors' Association meeting in Chicago on February 12, Wesley Bliffert, manager, ready mix department, Tews Lime & Cement Co., Milwaukee, Wis., traced the early history of ready mixed concrete and the types of equipment from the days of plant mixed concrete and haulage in open top trucks to the present modern batch plants and transit mix trucks. Mr. Bliffert pointed out that on smaller jobs, ready mixed concrete is ideal as the contractor cannot set up his own mixer equipment to handle these jobs economically. His company went into the business in 1934, starting with a small fleet of 2½ cu. yd. mixer trucks. With the expansion of this fleet and the building of batch plants at strategic points in the city of Milwaukee to reduce hauls, larger jobs are being handled but the smaller contractor is still a major source of business.

In Milwaukee today over 90 percent of the concrete sold last year was ready mix, except W.P.A. With ready mixed concrete, contractors have the advantage of running several jobs at the same time with a minimum crew. All waste and cleaning up expense are eliminated, and the contractor has more time to devote to selling and making contacts if he uses ready mix.

ARTHUR WENDT, Milwaukee concrete contractor, confirmed Mr. Bliffert's statements. He said that when he changed over to ready mix in 1934, he was able to do more work with half the crew. He later increased his business so that it required two crews of five men. Last year he had 500 house jobs of ready mixed concrete. Ready mixed concrete, he said, results in better concrete than job mixed because the concrete mix can be controlled better at a batching plant. It also takes the gamble in handling materials out of the contractor's hands. The ready mixed concrete company has 58 different mixes for various purposes at his disposal, and orders can be placed three or four hours in advance of requirements and even quicker service in case of emergencies.

Old friends get together at the show. 9—Tom Noble, Chicago, in a huddle with some pals. 10—George Bradshaw, Indianapolis, Ind., has a posey pinned on him. 11—Left to right, C. E. Jones, Miami, Fla., F. J. Straub, and C. H. Booth, New Kensington, Penn. 12—W. E. Spatz, left, and R. E. Weaver, Lincoln, Ill. 13—J. C. Ehle, Cleveland, Ohio, waits patiently to have a flower pinned on him. 14—Joe Nagy, Toledo, Ohio, listens attentively. 15—Ray Fricke, left, and Irving Fricke, Manitowoc, Wis., resting after an inspection tour through exposition. 16—Les Schwalbe, Milwaukee, Wis., center, shies away from a camera so his friends had to pose him

Expand Sand-Lime Activities

Votes to include producers of high-pressure steam-cured concrete products

REVERSING ACTION taken a year ago at its convention in New York City (ROCK PRODUCTS, March, 1940, p. 55) the Sand-Lime Brick Association at its annual meeting in Chicago, Feb. 10, 11 and 12, voted unanimously to broaden its activities and membership to include manufacturers of high-pressure-steam cured concrete products.

No Change in Name

At the closing session of the Sand-Lime Brick Association convention, President Perkins called for a report on the proposed changes in the constitution. Although no change was made in the name of the association, a provision has been made to include producers of concrete brick and block using the high-pressure-steam curing process. The dues will be on the basis of 2 cents per thousand sand-lime brick and a minimum of $25 annually for manufacturers of concrete block and brick.

A unanimous vote was cast for the reëlection of Chester A. Perkins, Mishawaka, Ind., as president of the association, and J. Morley Zander, Saginaw, Mich., as secretary-treasurer. Mr. Ryan, Windsor, Ont., was elected vice-president. The executive committee, in addition to the officers, consists of C. H. Carmichael, Philadelphia, Penn.; C. G. Miller, St. Louis, Mo., and Harold J. Levine, New York City. It was the recommendation of those at the meeting that future conventions be held co-incident with those of the concrete products associations, provided such meetings are held at some locations convenient to the majority of the members.

State of the Industry

C. A. PERKINS, Northern Indiana Brick Co., Mishawaka, Ind., in his address as president reviewed the progress of the industry since the depression, when along with the rest of the brick industry, it almost expired. He paid a tribute to the late John L. Jackson, who had so much to do with the founding of the industry in this country.

Mr. Perkins thought the industry faced a period of good business, for a short time at least. He emphasized that we were living in a period of revolutionary unrest, the world over, and that as business executives they must pay constantly more attention to the public interest.

Subsequently, contributing a paper on the association as a member, not officially as president, Mr. Perkins traced the history of the association.

Chester A. Perkins, reelected president, Sand-Lime Brick Association

One of the immediate problems concerns the future of brick itself, he said, since there is a trend toward larger masonry units; brick may never stage a comeback. Hence the technique of block manufacture, using both, or either, lime and portland cement is now important. With its background of experience in sand-lime brick manufacture the association is in a position to take the lead in developing knowledge and practice in the field of high-pressure-steam curing of concrete products.

HAROLD J. LEVINE, National Brick Co., Long Island City, N. Y., reporting for a committee appointed to study the problem of coöperating with the high-pressure-steam cured concrete products manufacturers, endorsed the views of President Perkins. He suggested: (1) that the Sand-Lime Brick Association amend its constitution and by-laws to provide for membership by these concrete products manufacturers; (2) make a study of dues; (3) provide that the Association should not be charged with the whole cost of new research; that such research funds be raised by those who are especially interested; (4) that a special committee be formed of high-pressure-steam cured concrete products manufacturers to raise funds for such research and determine the nature of the research to be undertaken.

ELMER COATES, Mutual Materials Co., Seattle, Wash., raised the subject of specifications for and sales to the United States Government for defense construction. The subsequent discussion developed that the Federal Housing Administration is using sand-lime brick for both exteriors and interiors. The Navy Department uses them without question, but difficulty has been experienced with the War Department in getting sand-lime brick used for anything but back-up work.

Several manufacturers and some of the government purchasing agents seem to be unfamiliar with Federal Specifications SS-B-681 which covers sand-lime brick. Nor did many recall the fire tests made many years ago by the Fire Underwriters Laboratory and later by the Bureau of Standards, which proved the fire resistance of sand-lime brick. A permanent committee of three was authorized to see what could be done to make the Federal Government departments and bureaus acquainted with these virtues of sand-lime brick.

New Light on Cements

DR. LANSING WELLS, National Bureau of Standards, reviewed, extemporaneously, two recent research papers of the Bureau (R. P. 1149 and 1355) which prove apparently that the really permanent binder in concrete is garnet in microscopic sizes. In high-pressure-steam curing, if carried on at sufficiently high pressures and for long enough periods, the hydro-silicates of silica, alumina and iron are dehydrated, or more accurately, silicon replaces hydrogen in the $6H_2O$ (water) of the hydrates, leaving garnet. Dr. Wells thought the same end product is formed during very long periods of time, as all concrete cures or ages.

J. MORLEY ZANDER, Saginaw Brick Co., Saginaw, Mich., spoke briefly of the need of greater technical knowledge on the part of sand-lime operators. He said in part:

"It has been repeatedly stated, and I believe not contradicted, that the bonding cement used in making sand-lime brick is calcium hydrosilicate. Therefore the making of sand-lime brick is a chemical business and if through ignorance or carelessness the chemical part of brick making is not properly completed, the product will be off grade and the business will suffer. It appears true that nearly all poor sand-lime brick and many of the poor sand-lime brick businesses were caused by neglecting or ignoring the importance of the chemical needs of the business.

"Accuracy is valuable in measuring, if satisfactory chemical results are to be obtained. It would seem to be very plain that if at all times the maximum amount of calcium silicate cement is to be present in the finished brick, that accurate measuring and very thorough mixing are required. Failure of a manufacturer to produce quality products starts with the materials used, but measuring and mixing are very important factors. The right ingredients and thorough mixing are the necessary steps to good brick.

"Having mixed the material completely and kneaded the ingredients together so that the lime and fine silica are united mechanically and diffused through the mass, the next step in the producing of calcium silicate cement is moulding and pressing.

"Lime and silica cannot react together unless they are mixed together mechanically in the first place, and the best way to keep sand and lime together after they are mixed is to press the brick so hard that there will be no separation. The foregoing leads to the final important step, heat treatment of the calcium and silica to make the necessary cement for holding the brick together, making it strong enough to carry the load, and durable against the weather. From tests run in the laboratory, and from tests made on commercial brick, the best pressure at which to operate the curing cylinders is 140 lb. per sq. in., but a pressure as low as 110 lb. will give good results. However, it must be maintained as high as 110 lb. during the entire curing period. It is safer to work at 125 lb. and maintain that very closely. The result will be a brick that is right mechanically and enduring because it is right chemically. Too often the chemical part in sand-lime brick manufacture has been overlooked, set aside for expediency or just not understood at all.

"Beginning in 1914 and running through the years to 1925 the United States Bureau of Standards carried on a long series of tests and experiments, and from these many valuable conclusions can be drawn. Had the makers of sand-lime brick studied these papers with more care and put into effect the methods pointed out, many plants would be in existence today that are now out of operation.

"Today, many sand-lime brick manufacturers, and a number who are not sand-lime brick manufacturers, are producing concrete products cured in the high-pressure curing cylinders common to the sand-lime brick industry. This has been termed high-pressure-steam curing, but high-pressure-steam curing does not mean only a way to accelerate the hardening of concrete blocks and brick. It means the application of the chemistry of sand-lime brick making to the making of concrete products. It will be wise for those now engaged in making concrete products by this method to study well the history of sand-lime products. Study the chemical results which should be obtained in the finished product, and how to get them. Start at the beginning and avoid the headaches of not understanding the necessary chemical reactions. The Sand-Lime Brick Association, the Bureau of Standards, the Portland Cement Association, all have been busy for years mapping the course to follow. In this talk I have been trying to point out that not only can time and money be saved by following the available information, but if money is to be earned, it must be by acquiring a knowledge of the chemical requirements.

Premium Lime Block

CARL MILLER, Missouri Hardstone Brick Co., Pacific, Mo., described making both standard (8-in.) and partition (3-in.) sand-lime block, which because of their white color and high quality command a premium of 2c per block over competitive cinder concrete block in the St. Louis market. These block test 1800 to 2450 lb. Special processing has been developed including hammer-mill crushing and tube mill grinding of the lump lime, hydrating the lime in sealed retorts with 60-lb. steam pressure, mixing the sand and hydrated lime in mullers. A Besser tamper, block machine is used.

The proportions used at this plant are 8 percent by weight of quick lime (equivalent to about 25 percent hydrate by volume). The pressure cylinders are well insulated; the blocks are steamed for 8 hrs. at 150 lb. pressure and remain in the cylinders 4 hrs. longer, with the steam not going below 100 lb.

RALPH CROMIS, Boice Bros., Pontiac, Mich., described a rack car for handling sand-lime block from the press through the pressure cylinders. Curing block is much more difficult than curing the brick, because the block will not stand stacking on each other the way brick are stacked. By especially designing a rack car and using smaller pallets they can now get 90 eight-inch block to a car, and 12 cars or 1000 block in a 56-ft. cylinder. This added a half million block capacity to the plant, which produces 2¼ million block per year. The block are made with portland cement and a 10 percent admixture of hydrated lime, by weight. Pebbles are used in the mix as well as sand. The cars are home-made and cost $65-$70 each.

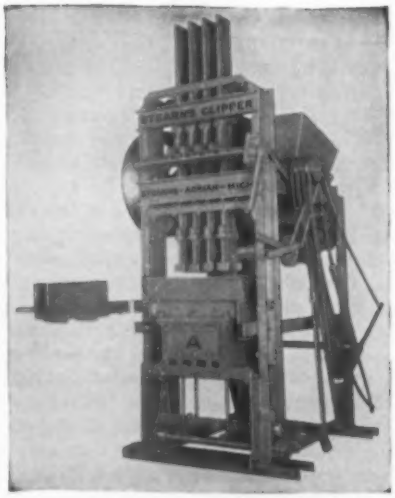
High Pressure Cinder Blocks

HAROLD J. LEVINE, National Brick Co., Long Island City, N. Y., told how his high-pressure-steam cured cinder block are competing in the highest class of New York City building construction with lower priced clay-tile block. They are extensively used for interior partitions with merely a paint finish. The process is similar to the manufacture of sand-lime brick, the portland cement cinder mix is put through a rod mill; about 5 percent of hydrated lime is used in the mix. The block are made in a Besser tamper block machine, equipped with a vibrator. The block are given the regular high-pressure-steam cylinder curing used for sand-lime brick. Mr. Levine expressed a desire to see comparative fire tests made of high-pressure-steam cured cinder block, and ordinary air-cured cinder block. He believed there is a great difference in fire resistance.

LEE BOWLING, Cinder Block, Inc., Roanoke, Va., described how his company was able to get stronger block by using 60 percent portland cement with 40 percent silica flour than by using straight portland cement. The silica flour is 90 percent through 200-mesh and costs approximately the same as the cement. The blocks are cured in cylinders at 120 lb. steam pressure for 8 hrs.

Kettle Insulation

MERRITT M. STONE, representing the M. H. Detrick Co., Chicago, Ill., described the use of mineral wool insulating materials as best savers on steam cylinders or kettles. He said it was possible to save 95 percent of the heat ordinarily lost through the uninsulated shell. The cost of the insulation, exclusive of labor of application, was about $25 per 100 sq. ft.



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"Stream-Line" Market for Cast Stone

Cast Stone Institute decides to expand promotional activities and research and organizes central source of storage for special aggregates

WITH THE PROSPECT for an enlarged market for cast stone resulting from the application of color and stream-lined design in modern architecture and the increase in building, the Cast Stone Institute took definite action to spend more money on sales promotion and research during the coming year.

President Arnold in opening the sessions Monday, February 10, welcomed the members and introduced Gil. Walker who presented the secretary's report. Mr. Walker emphasized the absolute necessity of producing quality products, and he urged all members to make standard samples in various sizes and aggregate composition. It is necessary, he said, to have these samples and be prepared to produce the quality of products on display in the sample room of the Procurement Division in Washington, D. C.

VERNON JOHNSON of the Theo. Johnson Co., Chicago Heights, Ill., described the new Lithicrome process of architectural ornamentation and its possibilities in cast stone. Mr. Johnson referred to several samples of the work on display in the convention room. He said that the mineral colors used in the process had been subjected to accelerated weathering tests representing 500 years of exposure and that the colors had remained fast.

In this process, an artist makes a pencil drawing which is then transferred to a rubber and glue composition, previously laid on the cast stone, which is to be decorated with the lithicrome process. This composition sheet has a sticky side which is laid on the stone and the other side is smooth and light colored to receive the transferred design from the pencil drawing. A sharp knife is used to cut out the design which is then sand blasted. The mi... al colors are blown by an air gun into the design which has been sand-blasted, and after a short drying period a liquid silica product is applied to seal the colors.

A. J. BOASE of the Portland Cement Association gave a very inspiring talk on the progress of architectural concrete. He said that last year 400 buildings had been constructed of architectural concrete east of the Rocky Mountains. Pointing to technical progress, he said that cast stone producers have increased compressive strength 40 percent and reduced absorption 30 percent. Mr. Boase said that the industry must promote the sale of its products because the public does not know about cast stone. He urged the industry to set up a 5-year promotion program.

Accent on Color

HERMAN FRAUENFELDER, secretary of Mo-Sai Associates, spoke on the subject, "A Renaissance in Architectural Ornamentation Through Cast Stone." Mr. Frauenfelder said that modern design does not lend itself to the old style ornamentation. Balanced masses and slick flowing lines in architecture, he pointed out, call for new modernistic designs. Entrances of sculptured figures and other simple ornamentation are coming back. People are becoming tired of flat surfaces.

Architects, he said, are itching to tell the story of scientific progress in building embellishment, and precast concrete offers the greatest possibilities in this trend. They are becoming interested in the use of color in names, and in geometric figures.

S. A. Elkan, Macon, Ga., new director of Cast Stone Institute, left, smoking cigar (not loaded) and Otto Formigli, Berlin, N. J., secretary-treasurer

Facing Material as Forming for Structural Concrete

C. A. BULLEN, manager of the Flexicore floor slab division, Midwest Concrete Pipe Co., Franklin Park, Ill., and formerly construction superintendent of the W. S. Bellows Construction Co., gave an interesting illustrated talk on the erection procedure of the San Jacinto Memorial at Houston, Texas. This is the tallest masonry structure in the world, and

M. A. Arnold, Greensboro, N. C., outgoing president of the Cast Stone Institute, left, and Otto Buehner, Salt Lake City, Utah, newly elected president

it was built by using the Cordova limestone facing as the outside form for the structural walls of solid concrete. Mr. Bullen pointed out that this structure would have been ideal for the use of precast concrete slabs, but no manufacturer had available facilities to supply the units and none bid on the memorial. An inside framing of steel permitted the elevation of materials from the inside to the top of the structure as the work progressed. If precast concrete slabs had been used, the erection cost would have been much smaller. Both weight and area are important factors in erection costs, he said. The cost of erecting the stone was 25c per cu. ft.

Bigger Market for Specialized Products

P. M. WOODWORTH of the Portland Cement Association spoke to the convention on the Opportunities for Cast Stone Manufacturers in Standardized Precast Concrete Products. Mr. Woodworth gave an encouraging picture of the broadening markets for specialized concrete products. He said the Dodge reports showed that 50 percent of the construction dollar goes into residential construction and 15 percent of this construction involves the use of concrete masonry.

Mr. Woodworth outlined the probable market for various special precast products. He said there was a market for 3,000,000 lin. ft. of slip sills for residential construction; 2,440,000 lin. ft. of sills for industrial construction; and 1,000,000 lin. ft. of coping. Another large market that may be developed is approximately 3,000,000 lin. ft. of precast treads and risers for basement stairs. The market for floor slabs in 1940 increased five times over that of 1938. Mr. Woodworth suggested that a committee be appointed to select a standard sill design which could be used interchangably with wood or steel sash. He mentioned one defense factory job which resulted in orders for 4000 ft. of sill and 4000 ft. of coping. It was suggested that a concrete mold be used to give the desired finish.

To show the possibilities of standardized precast concrete products, Mr. Woodworth presented slides of standard sills, coping, and precast risers and treads.

GIL. WALKER reported on reinforcing in cast stone at the session Monday night. Reference was made to the tests made by Dr. McMillan of the P.C.A. It was indicated from an analysis of these tests that reinforcing did not appear to be essential where cast stone is not used as a structural unit. Where cast stone is subjected to load stresses, the cracks, should they occur, would be very small.

OTTO FORMIGLI told how he had eliminated cracking of sills. He does not use any reinforcing. President Arnold said that for one housing project, all reinforcing had been eliminated from sills under 36 in. wide, and over 36-in., two ¼-in. rods were used. On private jobs, all reinforcing had been eliminated in sills up to 55-in. The federal government apparently continues to insist upon reinforcing. Mr. Harter said he had experienced no evidence of cracking with both slip and lug types of sill in which reinforcing had been left out.

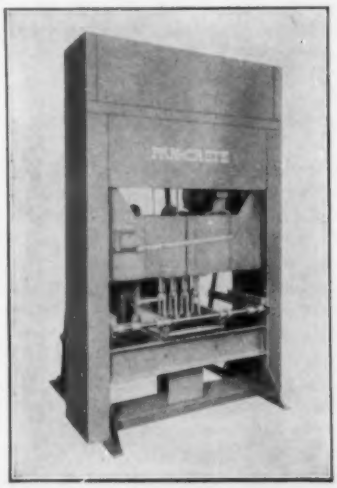
Mr. Elkan reported development of cracks with long sills having ⅜-in. reinforcing rod and no cracks with short sills without reinforcement.

Round Table Discussion of Manufacturing Problems

MR. DOWNING of Edmonds Art Stone Co., Washington, D. C., led in the discussion of operating problems with a very practical paper in which he stressed the value of having a neat and orderly plant. He also emphasized the importance of a close grading of aggregates in controlling the mix; the necessity of ample bin capacity, preferably in four sizes; and the value of weighing out cement and aggregates and control of water in the mix to have the right water-cement ratio. Mr. Downing described his methods of vibration and curing. He

(Continued on page 83)

A LOT OF MACHINE FOR A LITTLE MONEY



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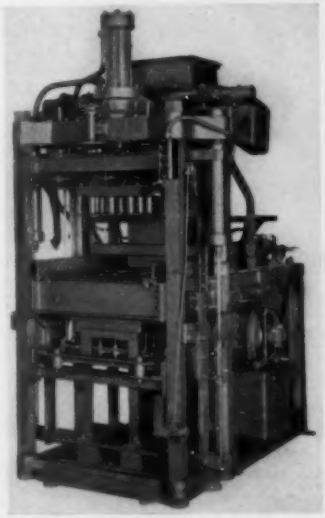

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Airports Big Market For Concrete Pipe

A CONVENTION PROGRAM with no scheduled speakers was offered by the American Concrete Pipe Association, at its thirty-fourth annual convention on February 10 and 11 at the Edgewater Beach Hotel in Chicago. All topics on the program were handled by open discussion with those in attendance interchanging experiences and information.

All officers were reëlected for 1941. H. D. Palmore, president of the Kentucky Concrete Pipe Co., Frankfort, Ky., is president, and vice-presidents are J. W. Porter, secretary, Gifford-Hill Pipe Co., Dallas, Tex.; J. E. Miller, president, Lewistown Pipe Co., Fort Wayne, Ind.; and L. D. Bailey, president, The Cretex Companies, Elk River, Minn. M. W. Loving is secretary-treasurer.

H. E. Eschenbrenner, Universal Concrete Pipe Co., Columbus, Ohio, left, listening to C. H. Bullen, Midwest Concrete Pipe Co., Franklin Park, Ill.

Mr. Loving said there doesn't seem to be very much in prospect in the public works field. The PWA is a more or less dead issue now and the WPA seems to be centered around construction work for the national defense program.

He mentioned some of the first large airports which used large amounts of concrete pipe for drainage and which are establishing a precedent for using concrete pipe on other airport projects.

The question came up as to how much concrete pipe was being used for airports. The records show that two-thirds to three-fourths of the amount of pipe authorized by the Quartermaster Corps has been in concrete pipe.

In some instances the question has come up whether concrete pipe can withstand the impact of planes landing. Answers have been included in the recently issued Bulletin 22 on "Concrete Pipe for Airport Drainage."

EVERETT KREITZ, Washington, D. C., who has done some work for the Association in the capital, was present and briefly reviewed the type of work a man in Washington must do in obtaining information on legislation and federal activities. Apparently there is going to be a great deal of airport building in the near future. Blanket approval by coöperative effort of the army, navy and WPA will be given on 450 airports. Of these, material orders for projects totalling less than $200,000 will never reach Washington. Local airport engineers will be given responsibility in selecting materials for such projects. Where the WPA does the major work the Civil Aeronautics Authority will initially cooperate with it and the WPA will take over on actual construction. In Mr. Kreitz's opinion there would not be much trouble in getting concrete pipe specified for airports, although there might be some initially.

Navy specifications call for concrete pipe in agreement with other governmental departments in Washington. At present concrete pipe is included on probation. Mr. Kreitz expressed the opinion that there seems to be no reason why it shouldn't be accepted on all projects. It was recognized that a single failure, due to poorly-made pipe or improper placement, might seriously injure the industry. Generally, concrete pipe that is made by reputable manufacturers will be accepted. Pipe accepted by the navy must meet specification SS-P-371.

H. W. EASTERLY, vice-president, Concrete Pipe and Products Co., Richmond, Va., told about his experience in getting concrete pipe included as material for construction at Camp Lee, Va.

Following the discussion of the Washington picture and previous consideration of the advisability of having a Washington representative for the Association, it was voted that the executive committee employ a full time Washington representative for a period of one year or more.

More research is necessary to determine whether the present ruling on safe heights to fill over concrete pipe could be modified, and there was considerable discussion on whether a grant be set up for the Iowa State College or the Washington state highway department or both to make a study on the problem. It was coted that the matter be referred to the executive committee for their decision.

H. D. Palmore, Kentucky Concrete Pipe Co., re-elected president, A. C. P. A.

It was also voted that the Association immediately proceed to gather data and publish an engineering handbook on concrete pipe, the cost of which is not to exceed $1.50 provided commitments are received for more than 5000 copies. The preparation of certain sections of the book will be delayed until the new proposed A.S.T.M. specifications have been approved.

H. W. Easterly, Concrete Pipe & Products Co., Richmond, Va., at the Concrete Industries Exposition

It was voted that the following tentative A.S.T.M. specifications be advanced as standard: C14-40T for concrete sewer pipe, C75-40T for reinforced concrete sewer pipe, and C76-40T for reinforced concrete culvert pipe.

The Association will hold its 1941 convention in New Orleans, La.

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NEW MACHINERY * NEW EQUIPMENT

Quarry Skip Buckets With Automatic Pickup

DEMPSTER BROS., INC., Knoxville, Tenn., has announced a new model "AP" to its line of Dempster Dump-

Above: Skip bucket in carrying position. Below: Backing up to pick up loaded 2-cu. yd. container

sters, which has an automatic pickup feature for handling loaded skip buckets. The automatic pickup is similar to a fork truck, and is designed to eliminate the labor in attaching lifting chains on the truck hoisting mechanism to loaded containers in the quarry.

In dumping, a bail on the back of the bucket is engaged in an automatic dumping hook and a boom is lowered, transferring the load from the lifting forks to the bail and hook. The bucket is then tilted into the dumping position. After the load has been discharged, the boom is raised and the forks bring the bucket back up into its normal carrying position.

Variable Speed Rotation For Crane-Shovel

THE KEYSTONE DRILLER CO., Beaver Falls, Penn., has announced a 1 cu. yd. to 1¼ cu. yd. crane-shovel with large booster-controlled positive main drum clutches and a planetary, variable speed rotation mechanism.

Known as Model 19A, the shovel weighs 77,000 lb., and is designed for heavy duty, rock and earth excavation and for all types of crane and dragline service with lattice booms 40 to 60-ft. long. The truck frame and turntable are one-piece castings, and side frames are of machined cast steel. Clutches are over-sized, and crawlers are linked plates carrying a gravity pressure of 11½ p.s.i. There are three drum shafts above the deck, the main drum shaft being 5⅞ in. by 4 ft. 10 in. long mounted on 4-in. roller bearings. Drum clutches are of the internal expanding type.

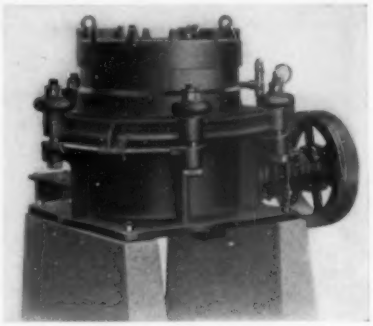
The crowding device is a chain drive to a sprocket on dead center of shipper shaft designed to eliminate internal torsion. The boom is of the tapered, box girder type. Power is supplied by a 4 cyl., heavy duty industrial type engine, but Diesel or electric

Crane-shovel with large booster-controlled positive main drum clutches and a planetary, variable speed rotation mechanism

power unit, may be furnished. Height of boom, with door open and boom angle of 60 deg., is 22 ft. 8-in., and the dumping radius is 26 ft. The rotating speed is up to 5.25 r.p.m.

Larger Cone Crusher

SMITH ENGINEERING WORKS, Milwaukee, Wis., has added a larger size intercone crusher to its line of reduction crushers. The latest development is a 28-in. intercone crusher similar



Intercone crusher has larger capacity

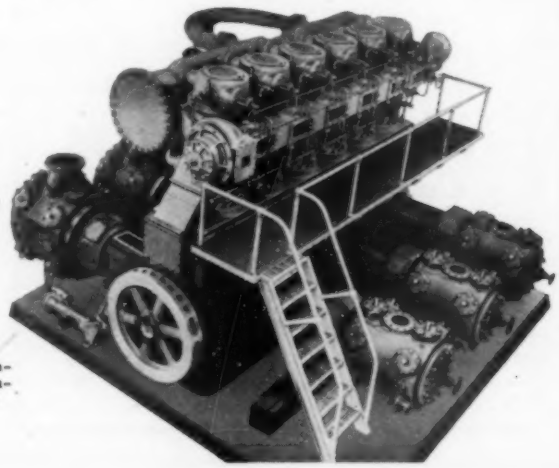
in general characteristics to the 18-in. model which has been in use for the past several years.

The addition of this larger model permits a bigger volume capacity without a large increase in the initial investment.

Steam-Driven Compressor

CLARK BROS. CO., INC., Olean, N. Y., has developed a line of large size steam driven compressors, based on their right angle, gas engine driven compressor design, which may be obtained in sizes ranging from 600 to 4000 hp. These new compressors have three to six power cylinders, and a corresponding number of compressor cylinders.

The power ends of these units are equipped with Unaflow steam cylinders. It is claimed that these compressors have relatively small floor space requirements, low foundation and building costs, economical steam rates, flexibility and minimum maintenance costs.

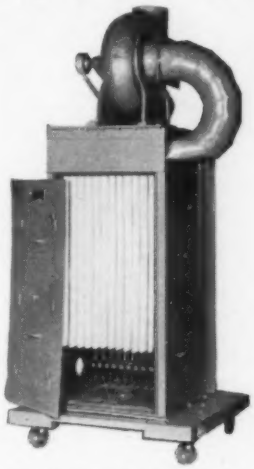


Right-angle type, steam-driven compressor occupies small floor space

Portable Dust Collector

THE W. W. SLY MFG. CO., Cleveland, Ohio has announced an improved model of its dust filter. It may be used as an auxiliary to larger filters or with individual machines requiring exhausting, such as grinders. Mounted on a platform with rubber-tired casters, the filter is readily portable, and is easily moved. The unit is also supplied unmounted, and can be placed on the floor, against a wall, or suspended overhead. Very little space is required as the exhaust fan is mounted on the filter.

Handling 1000 cu. ft. of air per minute, the filter is shipped completely assembled, including a 3 hp. motor which operates at 1800 r.p.m. The filter contains special cloth bags



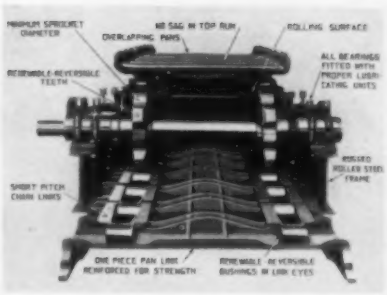
Small type dust collector

which thoroughly clean the dust-laden air. Bags are shaken by means of a shaker handle on the right side of the exterior to remove any clinging dust.

Heavy-Duty Feeder

ROBINS CONVEYING BELT CO., Passaic, N. J., has introduced the "Robins-Oro" apron feeder which is designed especially for heavy duty service in handling large tonnages of material. These feeders have manganese steel for all the wearing parts, and are built to require little headroom. Installations can be made in a horizontal position or inclined up to 16 deg. under average conditions.

These feeders are made in various lengths with 6-, 9-, 12- and 15-in. pitches, ranging in width from 24 in. for the 6-in. pitch to 96 in. for the 15-in. pitch. The small feeder (24 in. wide, 6-in. pitch) requires only a 1½-hp. motor and handles 92 tons per hour of 5- to 9-in. lumps, and the largest (96 in. wide, 15-in. pitch) handles 1800 tons per hour of from 29-


MINIMUM SPROCKET DIAMETER
NO SAG IN TOP RUN
ROLLING SURFACE
OVERLAPPING PANS
ALL BEARINGS FITTED WITH PROPER LUBRICATING UNITS
RENEWABLE-REVERSIBLE TEETH
WELDED ROLLED STEEL FRAME
SHORT PITCH CHAIN LINKS
ONE PIECE PAN LIPS REINFORCED FOR STRENGTH
RENEWABLE REVERSIBLE BUSHINGS IN LUG EYES

End view showing construction details of feeder

to 45-in. lumps with 20-hp. required. These capacities are based on material weighing 150 lb. per cu. ft. and at a speed of 10 f. p. m. Sprockets on both head and tail shafts are built with reversible and renewable teeth of manganese steel.

Vibrating Screen with New Principle of Operation

ALLIS-CHALMERS MANUFACTURING Co., Milwaukee, Wis., Crushing and Cement Division, has developed a vibrating screen called the "Ripl-Flo," which is said to involve a new principle of operation.

Having an eccentric shaft working with the unbalanced force of the counterweighted flywheels, the new mechanism vibrates the entire screen body in rapid, circular, gyratory motion. It is said to have smooth operating characteristics, high capacity, and a neat compact design, making it especially suitable for screening sand, gravel, stone, coal, and coke products and other granular materials.

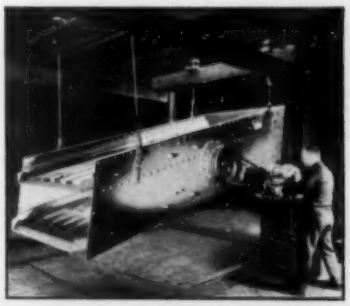
The screen consists of two high tensile steel side plates spaced apart by welded steel deck supports, with the operating mechanism enclosed in a tubular housing between the decks. The shaft is eccentric between bearings and provides much of the force which causes the screen body to gyrate. Fine adjustments for balance are made in the flywheels externally.

Diagonal deck concentrating table of large capacity

The two bearings are large and of the anti-friction type. One of the flywheels combines the Texrope drive sheave through which power from an electric motor is applied. The flywheels themselves do not gyrate, as the shaft is so turned that their center of rotation coincides with the center of gyration of the screen body. The power required is said to be very low, and the drive so smooth that long life is expected from the bearings and driving belts. The new screen is of the inclined type.

Like other screens designed by Allis-Chalmers, the equipment may be supported by cables attached to an overhead structure or to an existing overhead building member. Structural floor mounted bases can be provided where this type of mounting seems preferable.

This screen will be built in single and double deck types in sizes up to



High capacity vibrating screen of compact design

and including 6 x 14 ft. The single deck screen is so designed as to permit easy change-over to a double deck screen, in the field, should the occasion arise.

Glass Sand Recovery With Concentrating Table

THE DEISTER CONCENTRATOR CO., Fort Wayne, Ind., brought out recently a diagonal deck, No. 6 concentrating table which is particularly adaptable for the recovery of phosphate rock, the cleaning of glass sand, and the recovery of mica. The concentrating table equipped with pool sand riffling will handle from 20 to 50 tons fine sand feed and 30 to 250 tons coarse sand feed per 24 hr.

With the diagonal deck feature, it is said that maximum benefits are obtained from the deck area and riffling by profiting through the response of the natural tendencies of the pulp traversing the table. Another feature is the anti-friction head, integrally mounted on the main frame. The unit requires only 2 hp. to start and operates at substantially ½ hp. under continuous operation.

NEWS ABOUT PEOPLE

M. L. SILCOX, chief chemist at Pennsylvania-Dixie Cement Corp.'s plant at Des Moines, Iowa, has been transferred to the company's Nazareth, Penn., plant as superintendent. He has been associated with the company since 1926.

•

ROBERT C. FENNER has been elected president, general manager and a director of the Consumers Co., Chicago, Ill. He succeeds Martin H. Kennelly, who resigned as chairman of the executive board. Mr. Kennelly, who is also president of the Werner Brothers-Kennelly Storage and Moving Co., was one of the five trustees appointed by Federal Judge James H. Wilkerson when the Consumers Co. was reorganized under 77-B in 1937.

Mr. Fenner, the new head of the company, at one time was head of the Dixie-Vortex Co., and later an industrial consultant. Joseph Hock, who has been president, resigned because of ill health but will remain with the firm as an adviser. Delbert A. Clithero, member of the law firm of Campbell, Clithero & Fisher, was elected a director to replace Mr. Hock.

•

R. A. MATTHEWS has been made superintendent of the Dutch Gap, Va., plant of the Richmond Sand & Gravel Corp. He formerly was with the Arundel Corp. S. T. Will, former superintendent of the Dutch Gap plant has been transferred to Norfolk and is in charge of both the Hampton and Norfolk plants of the Richmond Sand and Gravel Corp.

•

CLIFFORD W. SINIFF recently resigned as a member of the Indiana State Highway Commission to become a special representative of the American Aggregates Corp. in Indiana, Michigan and Ohio. His home is in Indianapolis, Ind.

•

B. F. AFFLECK, retired president of Universal Atlas Cement Co., was awarded a certificate of honorary membership in the American Concrete Institute at its 37th annual dinner in Washington, February 19. He is one of 12 people who have been thus honored. Mr. Affleck attended the Institute's first convention in 1905, has taken a continuous active interest since then, and served two terms on the board of directors.

•

JOHN ROBERT SUMAN has been elected president of the American Institute of Mining and Metallurgical Engineers for 1941. He has been vice-president in charge of production of the Humble Oil & Refining Co., Houston, Tex., since 1933 and a director since 1927.

•

WOODY GALLEON has left the Johnston Sand and Gravel Co., Helena, Ark., for a sales position with the Fischer Lime and Cement Co., with headquarters in Pine Bluff, Ark.

•

THOMAS S. HOLDEN, who is well known to the rock products industries and has been a speaker at National Sand and Gravel Association conventions, has been elected president of the F. W. Dodge Corp., succeeding the late Truman S. Morgan. Since 1937 he has been editorial director of *Architectural Record*.

•

G. W. BALANTYNE has been elected a director of the Ideal Cement Co., Denver, Colo. He has been assistant secretary and treasurer since 1932 and auditor since 1936.

GEO. A. MATTISON, JR., who was re-elected president of the National Slag Association at its annual convention, became actively interested in the slag industry more than twenty years ago when he helped his father organize the Woodstock Slag Corp., which he now heads. The company was organized at Anniston, Ala., and moved to its present location, Birmingham, in 1922. In the earlier years of the company, Mr. Mattison was plant superintendent and secretary of the company. Later he was vice-president and general manager, and when the senior

George A. Mattison, Jr.

Mattison died in 1936 he became president.

Mr. Mattison sandwiched his college education between service in the first World War, receiving his degree as an electrical engineer from Alabama Polytechnic Institute in 1919. He was born in Taladega, Ala., Nov. 5, 1898, is married and has three children. He belongs to numerous organizations and enjoys fishing and football as hobbies.

(Obituaries appear on page 93)

Members of the Quarter Century club of employes of the Ash Grove Lime & Portland Cement Co., Kansas City, Mo., extend congratulations to President L. T. Sunderland and express appreciation for the cordial relationship between management and employes. Included are members who journeyed from the Chanute, Kan., and the Galloway, Mo., plants to congratulate Mr. Sunderland

MAXIMUM HAULING . . .

At A Minimum Cost!

At the quarry, where smooth, quick power is a vital factor; the Lima Shay Geared Locomotive is an important production unit. Lima Shays are designed to haul maximum payloads over the toughest grades quickly and economically.

The design of the Shay, with all parts readily accessible, facilitates the job of lubrication, adjustment, or repairs. Investigate the full possibilities of Lima power in your quarry.

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LIMA, OHIO

Sales Office: 60 E. 42nd St., New York, N. Y.

One Good SMITH-MOBILE *Deserves Another!*

The first Smith-Mobile purchased by Pennsylvania Supply Co. two years ago.

More Repeat Orders are Pouring in Daily

Ready-Mixed Operators everywhere are clamoring for more Smith-Mobiles. Why? Because they have had the opportunity to put this dependable machine through its paces. They KNOW from their own practical experience that Smith-Mobile meets every modern truck mixer requirement. They KNOW it's the ORIGINAL HIGH DISCHARGE truck mixer, thoroughly field-tested and backed by the world's leading concrete mixer manufacturer. So don't take chances on new and untried truck mixers. At least, investigate Smith-Mobile. 4 sizes available—2 cu. yds. to 5 cu. yds. as truck mixers—(2½ cu. yds. to 6 cu. yds. as agitators). Write for catalog 198-A.

THE T. L. SMITH COMPANY
2885 N. 32nd STREET • MILWAUKEE, WISCONSIN

Today's fleet of Smith-Mobiles owned by the Pennsylvania Supply Company. Satisfactory performances prompted the company to acquire additional Smith-Mobiles when more units were needed.

THE *Modern* TRUCK MIXER and AGITATOR

A 3316-1H

Universal Atlas To Build To Lehigh Valley Plant

UNIVERSAL ATLAS CEMENT CO., New York, N. Y., U. S. Steel Corp. subsidiary, is to build a new, modern cement plant at Northampton, Penn., in the Lehigh Valley, according to an announcement from President Blaine S. Smith. Construction will start at once, and is a part of the company's modernization and rehabilitation program begun about four years ago. This program has been accelerated by the demand for cement for national defense construction. Standard gray, high early strength and white portland cements will be manufactured.

One of the first cement plants built in the Lehigh Valley was by a predecessor company of Universal Atlas in 1888. The company has been doing business continuously in the Lehigh Valley for over 50 years.

$300,000 Crushing Plant

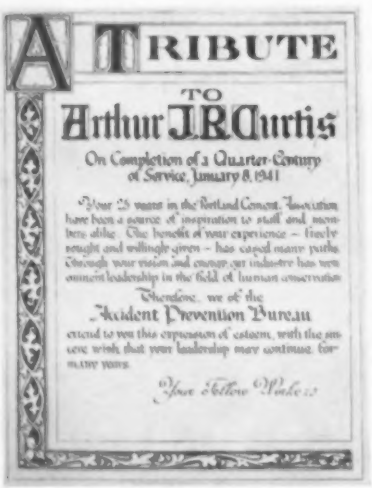
PALMETTO QUARRIES CO., Columbia, S. C., has under construction a new stone crushing plant which is estimated to cost about $300,000. Rust Engineering Co. was awarded the contract. According to newspaper reports, defense construction made larger capacity necessary.

Enlarged Gravel Plant

MONESSEN SAND AND GRAVEL CO., Monongahela, Penn., has been forced to move from its location due to a property sale and will open a new and larger plant.

Building Talc Plant

BRYSON TALC CO., Marion, N. C., is building a new talc milling plant, scheduled for completion early this spring. Crude rock is to be hauled nine miles from company-owned mines, already in operation, to the mill, which will have a capacity of 30 tons per day. Herman J. Bryson is president of the company, W. C. Olwine is vice-president and Col. A. S. Jameway is secretary-treasurer.


A TRIBUTE
TO
Arthur J. R. Curtis
On Completion of a Quarter-Century of Service, January 8, 1941
Your 25 years in the Portland Cement Association have been a source of inspiration to staff and members alike. The benefit of your experience — freely sought and willingly given — has capped many paths. Through your vision and energy our industry has won eminent leadership in the field of human conservation.
Therefore, we of the
Accident Prevention Bureau
extend to you this expression of esteem, with the sincere wish that your leadership may continue for many years.
Your Fellow Workers

Hand-lettered tribute recently presented to A. J. R. Curtis for the completion of 25 years in the service of the Portland Cement Association. The presentation was made at a luncheon in his honor on January 16. Mr. Curtis is assistant to the general manager of the Association and also secretary of the Committee on Accident Prevention and Insurance of the Association. He has been a frequent contributor to ROCK PRODUCTS

Marblehead Lime Sells Springfield Plant

ASH GROVE LIME AND PORTLAND CEMENT CO., Kansas City, Mo., has purchased the lime plant and quarry of the Marblehead Lime Co. at Springfield, Mo. The same personnel will be retained at the plant. Marblehead owns and operates several other properties.

New Gravel Plants

COMMONWEALTH SAND AND GRAVEL CORP., Norfolk, Va., has completed a new plant on the Darbytown road, Richmond, Va. Operations began February 1.

•

FRIEND SAND AND GRAVEL CO., of Petersburg, Va., has started operations at a new plant two miles east of Petersburg. Capacity of the plant is 1500 tons in 8 hr., 60 percent of which will be sold for construction at Fort Lee.

•

Grinding Pebbles

KING SOLOMON MINES CO., San Francisco, Calif., was included among the domestic suppliers of grinding pebbles listed in the January, 1941, issue of ROCK PRODUCTS, p. 88. Word has been received that this company should be removed from the list as the pebbles it did collect were for its own use. On December 5, 1940, the mine ceased operations and was liquidated.

Unanimously Oppose State Cement Plant

REJECTION OF A BILL to establish a state-owned cement plant at Waupun prison in Wisconsin has been unanimously recommended by the assembly commerce and manufacturers committee. As part of the argument for opposition to the scheme, a letter of protest from local 34 of the United Cement, Lime and Gypsum Workers International Union of the Manitowoc Portland Cement Co. was read, stating that existing markets were insufficient to keep the plant running continuously.

5,000,000 Bbl. of Cement for Panama Canal

PANAMA CANAL purchasing office will ask for bids on 5,000,000 bbl. of cement for use in constructing a third set of locks at the canal. Both eastern and western cement companies are expected to bid on the order, probably on an f.o.b. plant basis. Shipments will not begin for a year.

Judging from the terms of the bids, the lettings on either coast will depend upon competitive shipping rates and services. It is believed that Pacific Coast cement manufacturers might find it feasible to charter vessels. Successful bidders may be required to build silos at the canal for storage, although it is not yet known whether cement in bulk or bags will be required.

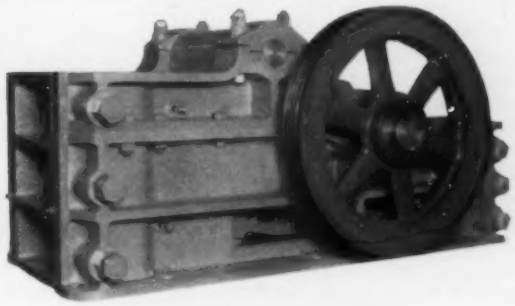
National Gypsum To Buy Mineral Wool Producer

NATIONAL GYPSUM CO., Buffalo, N. Y., has been negotiating for the purchase of the General Insulating and Materials Co., St. Louis, Mo., with plants at Alexandria, Ind., Dover, N. J., and Dubuque, Iowa. Melvin Baker, president of National Gypsum, commenting on the purchase, said, "We now have a competitive position in all markets except for gypsum on the Pacific Coast and lime in the Middle West. Our program will not be completed until those gaps are finally closed." The company made application to SEC for approval of an issue of 60,000 shares of its common stock and not more than 3500 shares of preferred to cover the proposed acquisition.

$25,000 Fire Loss

CONNECTICUT HIGH TEST SAND AND GRAVEL CO., New Haven, Conn., a subsidiary of New Haven Trap Rock Co., had a fire recently in one of its three buildings, causing a loss of $25,000. Three 10-ton trailer trucks were destroyed in the fire, which started in the boiler room of a building used to manufacture concrete pipe.

Specify TISCO



MANGANESE STEEL CRUSHER PARTS

for LOWER CRUSHING COST

OUR 199TH YEAR

Whether in Jaw Crushers, Gyratories, Cones, Discs, Rolls or Hammer Mills, Manganese Steel is still the only material that will render uniform, dependable service in crushing operations.

TISCO Manganese Steel is uniform and dependable

Essential for low cost maintenance

WEARING PARTS FOR:

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Hammer Mills & Pulverizers
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Dredges, etc.
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Gas Cylinders
Grinding Balls

TAYLOR-WHARTON IRON AND STEEL CO.

HIGH BRIDGE, NEW JERSEY

PLANTS AT HIGH BRIDGE, N. J.—EASTON, PA

BOSTON • CHICAGO • CLEVELAND • CHARLESTON, W. VA. • NEW YORK
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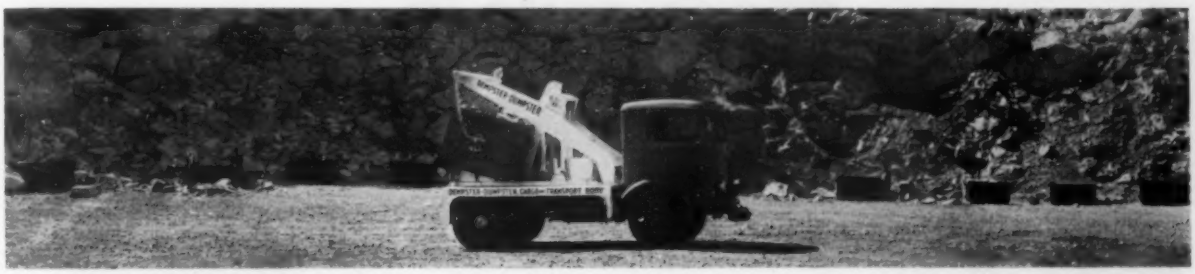


Drop-Bottom

DEMPSTER DUMPSTER

The Original Bucketrux

Tilt-Type

A. D. Carter, successful Contractor from Alabama, now furnishing crushed stone for one of the Tennessee Valley Authority, C & M Division, Projects, says—"I am using a Model 150 DEMPSTER-DUMPSTER with 8 Drop-Bottom Buckets of 1½ cu. yds. capacity and am hauling an average of 525 to 560 tons of stone in an 8 hr. day from the face of the quarry to the crusher. The Hoisting Unit is mounted on a 1½ ton conventional type truck chassis."

Hundreds of successful operators are having similar Profitable Experiences with DEMPSTER-DUMPSTER. Ask the men who use them.

MECHANIZE • MODERNIZE • DUMPSTERIZE • ***Write for Details for our Trial Offer***

DEMPSTER BROTHERS, Inc. KNOXVILLE TENNESSEE

Defense Highways

FEDERAL WORKS ADMINISTRATOR CARMODY has submitted to the President a survey of urgent defense highway needs made by the Public Roads Administration in collaboration with the Navy, the Army and the National Defense Advisory Commission. The report divides the general defense road program into those roads primarily required for defense operations to be financed entirely with federal funds, and the improvement of the strategic highway system to be financed jointly by the federal government and the states with liberalized federal participation.

Immediate appropriations totaling $287,000,000 are recommended, of which $150,000,000 would be for access roads, $25,000,000 for tactical roads, $100,000,000 for the strategic highway system and $12,000,000 for advanced planning for development of the strategic highway system.

The report recommends the following supplementary legislation by amendment of Federal Highway Act:

(1) Authorize additions to the federal aid system of any roads conforming to the main lines of the strategic network, as designated by the War and Navy Departments.

(2) Make roads and bridges on auxiliary lines of the network eligible for improvement with federal aid secondary road funds.

(3) Permit the use of federal aid funds in payment of part of the cost of acquiring necessary rights-of-way and attendant property damage.

Natural Gas Denied to Cement Plant

CALAVERAS CEMENT CO., San Francisco, Calif., has been denied its request for a pipeline easement into the Rio Vista natural gas field, after protest by the Standard Oil Co. that such a grant would violate its rights. The company had intended piping about 3,500,000 cu. ft. of gas per day to its plant at San Andreas, Calif.

Retail Plant for Cement

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., has purchased property in Spokane, Wash., and is planning to build a warehouse, packhouse and five cement storage silos to handle shipments out of Spokane that were handled directly from its manufacturing plant at Metaline Falls, Wash.

Announce V-Belt

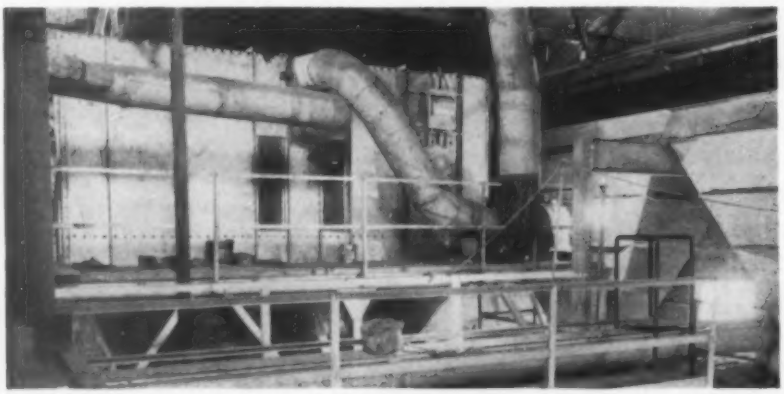
THE CINCINNATI RUBBER MANUFACTURING CO., Cincinnati, Ohio, has announced that they are now manufacturing multiple V-belts which are available in all standard sizes regularly required.

In the accompanying illustration is a cross section of the new V-belt which shows its construction. It has a heavy, elastic fabric envelope to

Cross section of V-belt showing construction

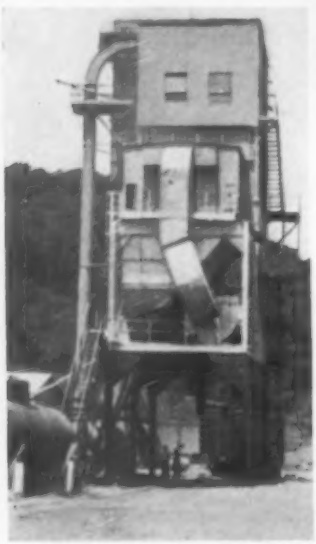
take up the outside wear which is said to facilitate ready flexing and it holds tightly to the groove. The load is carried by a cord section of high tensile, low stretch cords thoroughly impregnated with liquid rubber and then imbedded in a cushion of rubber providing lengthwise flexibility and easy flexing around the pulleys.

Another advantage claimed for this multiple V-belt is that uniform cross sections enable each belt to seat itself perfectly in the groove. Each belt is matched so that it will carry its equal share of the load.



IN CEMENT FINISHING MILL

Parsons Continuous Operating Oval Bag Dust Arrestor. The filter relieves pressures built up in the air separator.



SERVING QUARRIES AND ROCK CRUSHING PLANTS

Above: Parsons Oval Bag Dust Arrestor collecting dust from a rock crushing plant. The dust is being sold as a filler.

PARSONS OVAL BAG DUST ARRESTORS

- STOP THE DUST NUISANCE.
- COLLECT FINES THAT HAVE DEFINITE SALES VALUE.

In every rehandling operation in cement plants, crushed stone plants and quarries, the elimination of the dust handicap—and the collection of valuable fines — is not only COMPLETE but hits a new low in cost when you install a Parsons Oval Bag Dust Arrestor.

THE BAGS WILL NOT PLUG. They STAY "new" in filtering capacity—and need no replacements for an overage of more than ten years. The working parts—and case—are sturdily constructed for long life. Write for Bulletin DA-6.

Complete Line of Dust Arrestors

Continuous Automatic — Oval Type Bag — Unit Type — All-Metal Parclone Centrifugal.

PARSONS

PARSONS ENGINEERING CORPORATION

3595 E. 82ND STREET CLEVELAND, OHIO

If you are SCREENING highly abrasive materials

You can get longer service life . . . and lower screening costs . . . with Hendrick Heat Treated Perforated Plate. It is available in any size or shape of perforation, flat or double corrugated.

Write for a copy of "Hendrick Perforated Plate for Vibrating and Shaking Screens." Contains a wealth of information, including complete data on all types and sizes of openings.

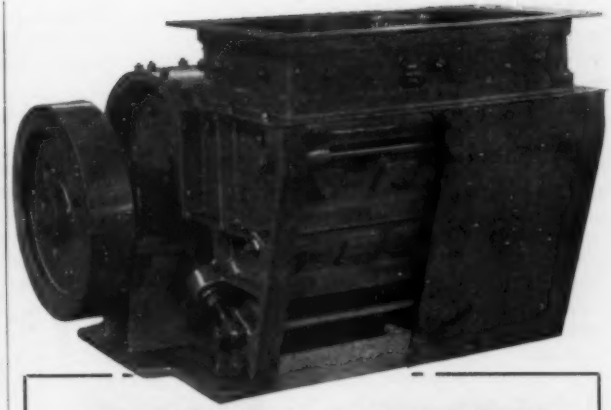
HENDRICK MANUFACTURING CO.

47 Dundaff St., Carbondale, Pa.

SALES OFFICES IN PRINCIPAL CITIES

PLEASE CONSULT TELEPHONE DIRECTORY

Makers of Elevator Buckets of all types, Mitco Open Steel Flooring, Mitco Shur-Site Treads and Mitco Armorgrids. Light and Heavy Steel Plate Construction.



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Keep Your Profit Curve Going Up

Here is a powerful crushing unit capable of withstanding terrific punishment and staying right on the job delivering more tonnage per hour and producing a better product.

AMERICAN equipment is backed by over 25 years experience in designing and manufacturing reduction equipment.

AMERICAN PULVERIZER CO.
1245 MACKLIND AVE. ST. LOUIS, MO.

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We are in the market for and would like to receive prices and literature on the items checked below:
RESEARCH SERVICE DEPARTMENT, *Rock Products*, 309 West Jackson Blvd., Chicago, Ill.

- ....Admixtures
- ....Aerial Tramways
- ....Aggregates (Special)
- ....Agitators
- ....Air Compressors
- ....Air Filters
- ....Air Separators
- ....Ash Receptacle Molds
- ....Asphalt Mixing Plants
- ....Batching Plants
- ....Bags
- ....Bagging Machines
- ....Balls (Grinding)
- ....Barges
- ....Batchers (Weighing)
- ....Bearings
- ....Belt Repair Equipt.
- ....Belting (Conveyor & Elevator)
- ....Bin Level Indicators
- ....Bins (Storage)
- ....Blasting Supplies
- ....Block Machines, Building
- ....Boats
- ....Brick Machines & Molds
- ....Buckets
- ....Building Tile Machines
- ....Bulk Cement Batching Plants
- ....Bulk Cement Storage Plants
- ....Bulldozers
- ....Bullscrapers
- ....Burial Vault Forms
- ....Calcining Equipment
- ....Calcium Chloride
- ....Carbon Dioxide Plants
- ....Cars (Industrial)
- ....Catch Basin Block Machines
- ....Cement Colors
- ....Cement Process
- ....Central Mixing Plants
- ....Chimney Block Mach. & Molds
- ....Clarifiers
- ....Classifiers
- ....Coal Pulverizing Equipment
- ....Concentrators
- ....Concrete Mixers
- ....Concrete Paints & Coatings
- ....Concrete Waterproofing & Dampproofing
- ....Contractors (Cement Mill)
- ....Conveyors
- ....Conveyor Idlers and Rolls
- ....Coolers
- ....Corn Crib Block and Tile Machines
- ....Correcting Basins
- ....Cranes (Crawler & Locomotive)
- ....Crushers
- ....Crushing & Screening Plants (Portable)
- ....Culvert Pipe Mach. & Molds
- ....Curing Equipment
- ....Curb Forms
- ....Derricks
- ....Dewatering Equipment
- ....Diesel Engines (Stationary & Automotive)
- ....Dippers & Teeth
- ....Disintegrators
- ....Dragline Cableway Excavators
- ....Drain Tile Machines
- ....Dredges
- ....Dredge Pumps
- ....Drills (Rock)
- ....Drill Bits
- ....Drill Sharpening Machines
- ....Drill Steel
- ....Drives (Gear Reduction)
- ....Dry Batch Conveyors
- ....Dryers
- ....Dust Collecting Systems
- ....Dust Precipitators
- ....Dust Recovery Plants
- ....Dynamite
- ....Electric Motors
- ....Electrostatic Separators
- ....Elevators
- ....Engineering Service (Consulting & Designing)
- ....Engines (Diesel, Gasoline, Steam)
- ....Feeders
- ....Floor Tile Machines
- ....Flotation Equipment
- ....Garbage Receptacle Molds (Concrete)
- ....Garden Furniture Molds (Concrete)
- ....Generators & M-G Sets
- ....Guns (Hydraulic)
- ....Gutter Block Machines (Concrete)
- ....Hoists
- ....Hoppers
- ....Hose
- ....Hydrators (Lime)
- ....Induced Draft Fans
- ....Joist & Slab Machines (Concrete)
- ....Kilns (Rotary, Shaft, Vertical)
- ....Laboratory Apparatus
- ....Lift Trucks
- ....Lime (Hydrated)
- ....Lime Handling Equip.
- ....Lime Plants
- ....Lime Putty Plants
- ....Loaders
- ....Locomotives
- ....Lubricants
- ....Manganese Steel Parts
- ....Mills (Ball, Compartment, Emery, Hammer, Rod, Roll, Tube)
- ....Mortar Mixers
- ....Pallets (Steel, Wood)
- ....Pans, Grinding (Wet & Dry)
- ....Perforated Metal
- ....Pipe (Dredge)
- ....Pipe Molds and Machines (Concrete)
- ....Plaster Mixers
- ....Pneumatic Hammers
- ....Portable Aggregate Plants
- ....Pulverizers
- ....Pumps (Pulverized Material)
- ....Railway Equipment
- ....Rectifiers
- ....Recuperators
- ....Refractories
- ....Rewashers (Screw)
- ....Rock Wool Cupolas
- ....Roofing Tile Machines
- ....Sand Drags
- ....Sand & Gravel Plants
- ....Sand Lime Brick Machinery
- ....Sand Settling Tanks
- ....Scales
- ....Scrapers (Power Drag)
- ....Screens (Revolving, Vibrating, Etc.)
- ....Seal Rings
- ....Septic Tank Molds
- ....Sewer Pipe Machines
- ....Shovels (Power)
- ....Silos (Storage)
- ....Silo Stave Machines
- ....Slakers (Rotary)
- ....Slurry Mixers
- ....Slurry Pumps
- ....Slurry Separators
- ....Slurry Thickeners
- ....Soft Stone Eliminators
- ....Speed Reducers
- ....Structural Steel Fabrication
- ....Tampers (Hand & Power)
- ....Tanks (Storage)
- ....Tires
- ....Tractors
- ....Transit Mixers
- ....Trucks (Agitator)
- ....Trucks (Dump)
- ....Trucks (Industrial)
- ....Trucks (Mixer Body)
- ....Unloaders
- ....Unloaders (Boat)
- ....Unloaders (Box Car)
- ....V-Belting
- ....Vibrators (Bin)
- ....Wagons (Dump)
- ....Wall Forms & Machines (Concrete)
- ....Washers (Sand, Gravel & Stone)
- ....Welding & Cutting Equipt.
- ....Well Curbing Mach. & Molds
- ....Wire Cloth
- ....Wire (Copper, Iron & Steel)
- ....Wire Rope
- ....Wire Rope Fittings

City _____

Individual _____ *Title* _____

Address _____

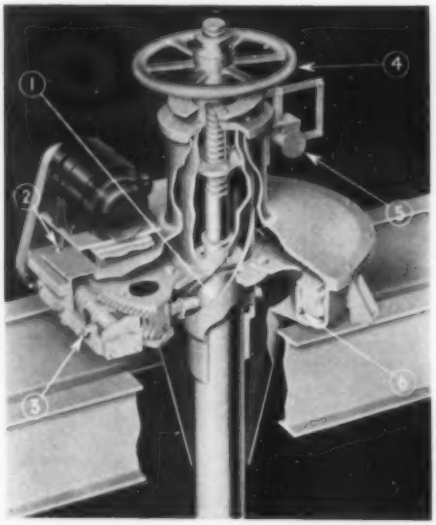
Firm Name _____ *State* _____

SELF-RELIEVING THICKENER

Features of the Hardinge "Auto-Raise" Thickener—

(1) Rollers on the scraper shaft are driven by the slotted tube attached to worm gear, excess pressure against scrapers in the tank bottom causes rollers on scraper shaft to move up incline, releasing the overload.
(2) Inspection cover plate over worm shaft.
(3) Worm shaft alignment device.
(4) Manual raise independent of auto-raise.
(5) Alarm and cutoff suitable when lift is excessively high.
(6) Ball bearings support entire mechanism.

For treatment of waste water in sand plants; also for use in wet process installations. Write for Bulletin 31-C.



HARDINGE
COMPANY, INCORPORATED — YORK, PENNSYLVANIA
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO

THE ROSS FEEDER

Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

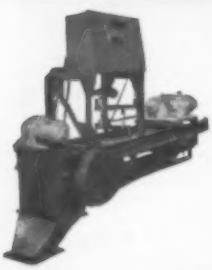
Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.

19 Rector Street
NEW YORK, U. S. A.

2 Victoria Street
LONDON, S. W. I., ENGLAND

What rate per hour? What weight per day?



The Feedoweight Gives the Answer

Feeding, proportioning and batching — entirely automatic. The result — finished products of uniform quality with minimum manufacturing costs. The FEEDOWEIGHT correctly and uniformly feeds material by weight. In addition, an automatic totalizer will give you the exact total weight of all material so fed. It is a machine of unexcelled accuracy. Eliminate guesswork in your plant.

Write today for bulletin 388.

MERRICK SCALE MFG. CO. 184 AUTUMN STREET PASSAIC, NEW JERSEY

Cement Production Jumps 45 Percent

BUREAU OF MINES reports that the portland cement industry in January, 1941, produced 9,025,000 bbl., shipped 7,986,000 bbl. from the mills, and had in stock at the end of the month 24,420,000 bbl. Production in January, 1941 showed an increase of 45.4 percent and shipments an increase of 105.1 percent, as compared with January, 1940. Portland cement stocks at mills were 5.2 percent lower than a year ago.

The factory value of the shipments from the mills in 1940—130,315,000 bbl.—is estimated at $190,926,000, representing an average value of $1.47 per bbl. Shipments for 1940 include approximately 4,407,000 bbl. of high-early-strength portland cement with an estimated mill value of $8,145,000. Statistics cover all manufacturing plants.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 159 plants at the close of January, 1940 and 156 plants at the close of January, 1941.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	Jan. 1940	Jan. 1941	Dec. 1940	Nov. 1940	Oct. 1940
The month	28.6	42.4	51.2	60.1	63.7
Twelve mos.	47.9	53.1	50.6	49.9	49.3

Sand-Lime Brick Production and Shipments

ELEVEN active sand-lime brick plants reported for January and eleven for December, statistics for which were published in February.

AVERAGE PRICE FOR JANUARY

	Plant Price	Delivered Price
Grand Rapids, Mich.	....	$14.00
Milwaukee, Wis.	$10.00	12.00
Mishawaka, Ind.	11.00	....
Saginaw, Mich.	10.90	....
St. Louis Park, Minn.	8.00	9.50
Seattle, Wash.	15.00	17.00
Sebewaing, Mich.	10.00	....
Syracuse, N. Y.	14.00	16.00C/L 20.00L/C
Watertown, Mass.	12.50	....

STATISTICS FOR DECEMBER JANUARY

	†December	‡January
Production	1,769,838	2,111,860
Shipments (rail)	65,000	249,000
Shipments (truck)	1,729,596	2,022,571
Stock on hand	1,679,919	1,850,475
Unfilled orders	1,665,000	1,945,000

† Eleven plants reporting: incomplete, one not reporting production, two not reporting stock on hand and six not reporting unfilled orders.

‡ Eleven plants reporting: incomplete, two not reporting production, two not reporting stock on hand, and seven not reporting unfilled orders.

Cast Stone Program

(Continued from page 71)

has found the use of fog nozzle spraying within the steam curing chambers very effective. Reference also was made to damp sand curing and the use of sealing compounds. Seven days wet curing, he said, is equal to a 20 percent saving in cement as compared to dry curing. President Arnold said that the grading of aggregates may very materially affect the curing results. Gil. Walker spoke about the difficulty of obtaining aggregates that were uniform as to grading and color.

Selling Ideas

STANLEY A. ELKAN, chairman, introduced Gil. Walker who presented the report on waterproofing. Five members tested various types of waterproofing, and the results influenced the recommendation. It was suggested that the specification on strength be amended to state that the minimum compressive strength be 6500 or 7500 p.s.i., and that absorption be reduced from 7 to 6 percent. The 3 percent minimum absorption is to be eliminated entirely. However, a letter ballot is to be taken on these recommendations.

Gil. Walker told about the permanent display in the sample room of the Procurement Division at Washington, D. C., and urged members to be prepared to make products corresponding to the samples on display. Mr. Downing of the Edmonds Art Stone Co., and Mr. Lloyd of the Washington P.C.A. office were given a vote of thanks for their part in assembling this exhibit.

Selling vs. Order Taking

OTTO BUEHNER gave an excellent talk on proper methods of selling various types of prospective buyers which he illustrated by reference to a large chart. This chart was blocked out to show the materials used in attracting the prospect and the source of leads. Below were listed the five types of buyers: Not Known, New, Acquainted, Occasional Buyer, and Regular Customer. Below these five types were listed the methods of approach, the sales arguments, and the promotional material for use with each type of customer.

In a discussion of the application of the proposed quality guarantee plan, Mr. Safford of New Ulm, Minn., said that the bond idea was received well by the architects but none agreed to incorporate it in the specifications. Mr. Walker said it was used in the specifications for the Sears building in Birmingham, Ala.

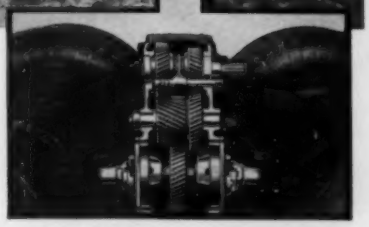
In the afternoon, a bus took the delegates to the Elmhurst Development Laboratory of the P.C.A., where the aggregate transfer method and the Lithichrome process were demonstrated.

New Officers

At the dinner and closing session Tuesday night, Gil. Walker of the P.C.A. outlined the proposed promotional campaign for the Cast Stone Institute. This program of expanded activities was divided into five parts: 1. Preparation of literature and publicity; 2. Greater field and laboratory service; 3. Promotion by mail; 4. Advertising; 5. Personal contacts. A field representative will be employed to assist in this work. It was the consensus of the majority opinion that the dues should be doubled to carry on this work. The entire program will be presented to the membership for a letter ballot.

New officers elected for the coming year include: President, Otto Buehner, Otto Buehner & Co., Salt Lake City, Utah; vice-president, Geo. Safford, American Artstone Co., New Ulm, Minn.; secretary-treasurer, Otto Formigli, Formigli Architectural Stone Co., Berlin, N. J.; director, Stanley Elkan, Elkan Stone-Tile Mfg. Co., Macon, Ga.

HERE'S WHERE THE WORK IS DONE!



TRACTION . . . NOT POWER ALONE IS WHAT YOU NEED

★

When there's heavy work to do, TWO driving axles under the load are better than one. Use the

THORNTON FOUR-REAR-WHEEL DRIVE

YOU SAVE MONEY!

Take a truck of 1½ to 3-tons original capacity and let us quickly and at low cost convert it to a husky unit of 30,000 lbs. or more gross vehicle weight capacity.

Two ratios, for power and speed, easily controlled by a lever in the cab. Walking-Beam Flexibility—Special spring construction keeps equal load on all four driving wheels —Perfect balance between power and weight.

THORNTON TANDEM CO.
8701-8779 GRINNELL AVE. DETROIT, MICH.

Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL which gives traction when slippery going makes trucks equipped with ordinary differentials helpless.

"When you need TRACTION you need THORNTON"

EAGLE
"Swintek" Screen
Nozzle Ladder

YESTERDAY'S CAPACITIES CAN'T MEET TODAY'S DEMANDS

Pump capacities increased 300% and power bills reduced by as much as 40% have been accomplished in many installations of an EAGLE SWINTEK Screen Nozzle Ladder. Cutters are especially designed to loosen otherwise unworkable deposits of sand and gravel. The traveling screen automatically carries away from in front of the suction all boulders and obstructions that are likely to cut down the steady flow of gravel. Quickly and easily adapted to your present equipment.

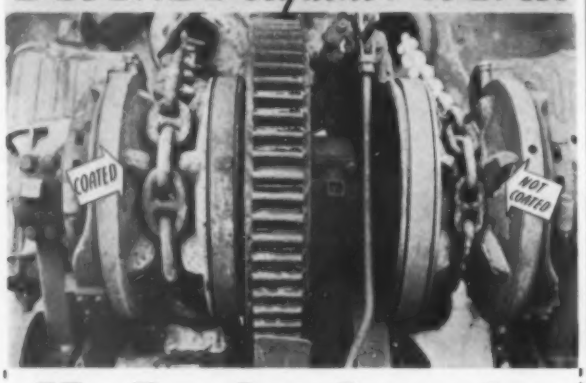
The screening and digging chain with cutters, insures an even, constant feed of solids to the suction pipe line. The regularity of flow of solids will materially increase pumping capacity. Less power is required. Pumping depth limited only by depth of deposit.

For further particulars write for our descriptive booklet on the EAGLE "SWINTEK" SCREEN NOZZLE LADDER. Also ask for information about EAGLE PADDLE LOG and EAGLE SCREW WASHERS.

EAGLE IRON WORKS

Des Moines, Iowa

DEFENSE *Against* WEAR



Mr. Dredge Operator

One look at the lugs on the two anchor reels shown above clearly illustrates how Coast Metal is a vital defense against wear and means big savings in replacement costs for the Nicholson Terminal & Dock Company, Ecorse, Michigan, on their dredge boat.

The lugs on the reel on the left were coated with Coast Metal No. 112, while those on the right hand reel were uncoated. Both reels were used only one season—while the coated lugs show no wear, the uncoated ones show extreme wear, resulting in inefficiency of operation, impaired safety and costly replacement.

Let us show you many other ways how Coast Metal will mean real defense against wear, where the going is tough. For instance, on dredge operations, Coast Metals give exceptionally good results on manganese steel pump shells and impellors in resisting abrasion from sand and gravel.

Write today for complete information.

COAST METALS, Inc. CANTON, OHIO

You get Operating Advantages in BLAW-KNOX BUCKETS *due to better Structural Features*

The rigid head in Blaw-Knox Buckets preserves fixed cable alignment between upper and lower sheaves, avoiding cable wear caused by loose or wobbly head construction

All four corner bars are mounted directly on the head pin, thus all impact or pounding action between the head and scoop structure is transmitted directly and not through bolts or rivets

This and many other exclusive features of Blaw-Knox Buckets are explained and illustrated in CATALOG No 1757 Write for your copy today

BLAW-KNOX DIVISION
of BLAW KNOX COMPANY
Farmers Bank Building • Pittsburgh, Pa

46

BLAW-KNOX *Digging and Rehandling*
BUCKETS

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Basic Dolomite, Inc.	$ .20	Mar. 15
Coronet Phosphate Co.	.50	Feb. 15
Lawrence Portland Cem. Co.	.25	Mar. 10
National Gypsum Co., pfd.	1.12½	Mar. 3
Schumacher Wall Board Corp., pfd. (arrears Feb. 16, 1941, $7.50)	.50	Feb. 15
Southern Phosphate Co.	.15	Mar. 28

•

CONSUMERS CO., Chicago, Ill., had net sales totaling $14,768,296 in 1940, compared with $13,245,192 in 1939. The company is one of the largest producers and dealers of sand and gravel and crushed stone in the Middle West. Listed current assets on December 31, 1940, were $4,008,089 against $3,518,398 on March 1, 1937 when Martin Kennelly retiring chairman of the board, assumed his position.

•

BESSEMER LIMESTONE & CEMENT CO., Youngstown, Ohio, reports a 1940 net income of $179,589 compared with $164,519 for 1939. First mortgage notes outstanding were reduced from $450,000 to $180,000.

•

LONE STAR CEMENT CORP., New York, N. Y., has issued a consolidated income account for the following years ended December 31:

	1940	1939
Sales	$22,709,636	$21,085,781
Costs and expenses	15,065,374	13,718,986
Operating profit	$7,644,262	$7,366,795
Other income	367,330	223,197
Total income	$8,011,592	$7,589,992
Depreciation and depletion	2,614,310	2,674,040
Federal tax, etc.	1,626,868	1,033,795
*Misc. charges	334,130	321,063
Net profit	$3,436,284	$3,561,094

•

UNITED STATES GYPSUM CO., Chicago, Ill., had a consolidated net profit of $7,052,974 in the calendar year 1940 as compared with a net of $7,365,847 in 1939. In spite of the fact that the operating profit in 1940 was $11,067,742 as against $8,471,987 in 1939, Federal and Canadian excess profits taxes of $2,084,625 brought the net profit down below that of 1939. Chairman Sewell Avery reported that residential building activity last year was at the highest level since 1929 and that the trend was continuing.

NEW HAVEN TRAP ROCK CO., New Haven, Conn., has reported total assets of $3,536,950 as of November 30, 1940, as compared with $3,461,000 for the same date in 1939.

•

WOLVERINE PORTLAND CEMENT CO., Coldwater, Mich., reports a net profit of $62,477 for the year ended December, 1940 which compares with $34,111 for a similar period in 1939.

•

ALBERENE STONE CORP. of Virginia, New York, N. Y., with a soapstone plant at Damon, Va., had a net income of $50,826, before federal taxes, for the year ended December 31, 1940. This compares with $44,548 for the calendar year 1939. Net sales in 1940 were $660,689 as against $566,762 in 1939.

•

AMERICAN SILICA SAND CO., Ottawa, Ill., reported a net loss of $33,156 for the year ended December 31, 1940. For a similar period in 1939, the net loss was $52,523.

•

PENNSYLVANIA GLASS SAND CO., Lewistown, Penn., has listed 31,000 shares of 5 percent cumulative $100 par preferred stock in exchange for outstanding voting trust certificates, 6,300 common shares in exchange for voting trust certificates issuable upon conversion of the $7 cumulative preferred stock (called for redemption on January 1, 1941) upon termination of the voting trust, and 5 common shares issued and outstanding, making a total of 31,000 5 percent preferred and 328,160 common shares authorized for listing. The voting trust agreement will be terminated January 6, 1941.

•

NATIONAL GYPSUM CO., Buffalo, N. Y., has been authorized to increase the number of shares of convertible cumulative preferred stock from 60,300 to 61,500. President Melvin H. Baker has announced that the acquisition of the Chemical Lime Co. facilities at Bellefonte, Penn., will add two limestone mines, 16 shaft kilns, and the largest rotary in the United States to the company's chain of 17 mills. Mr. Baker also expressed the opinion that residential construction in 1941 will show an increase of 10 percent over that of 1940.

Made of Acid Open Hearth Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

The Service Record of this wire rope continues to make and hold friends.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

Established 1857

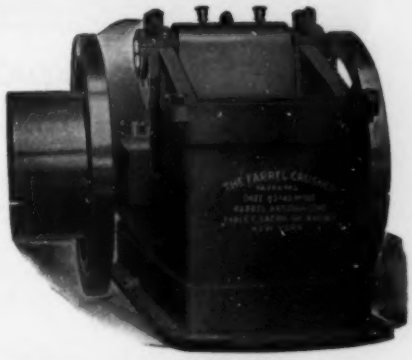
5909 Kennerly Avenue St. Louis, Mo.

New York — Chicago — Denver
San Francisco — Portland — Seattle

FARREL BACON CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

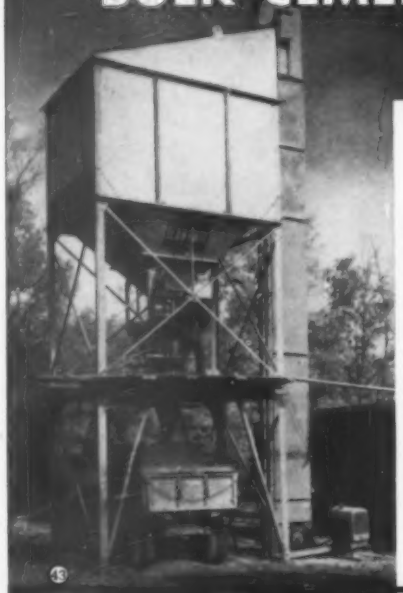
Engineering Service



EARLE C. BACON, Inc.

17 John St., New York, N. Y.

Facts and Figures on use of BULK CEMENT show SAVINGS of $40.00 per day



Astounding economies are possible through the use of properly designed and built—*trouble-free*—Blaw-Knox Portable BULK CEMENT PLANTS.

Data is available showing how users gain real money savings over the old methods of using bag cement—all through the use of this self-contained, efficient plant which unloads, elevates, stores, accurately weighs batches, and loads bulk cement into trucks, truck mixers, etc.

Blaw-Knox Bulk Cement Plants are furnished complete—nothing else to buy.

Send for these interesting facts and figures on the economy of using bulk cement. Yours for the asking.

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
FARMERS BANK BUILDING · PITTSBURGH, PA.

Blaw-Knox *Portable . . .*
BULK CEMENT PLANTS

BLAW-KNOX BINS AND BATCHERS · ROAD FORMS · STREET FORMS · CONCRETE SPREADERS · TAMPING ROLLERS · VIBRATORS
CONCRETE BUCKETS · CLAMSHELL BUCKETS · TRUCK MIXERS · STRIPING MACHINES · TURNTABLES · ROAD FINISHERS · STEEL FORMS

TRI-VIBE *Gives* TRIPLE *Effectiveness*
With Only ½ H.P.

PREVENTS BLINDING
SCREENS FASTER AND BETTER
SAVES ON POWER

Tri-Vibe Equipped Type C Leahy Screens are guaranteed to operate with only ½ H.P. and an annual maintenance less than 1% of purchase price.

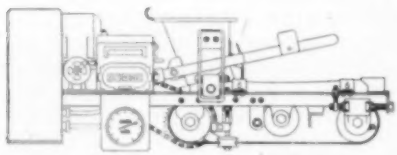
Leahy HEAVY DUTY Vibrating Screen

Write for bulletin No. 14-H

THE DEISTER CONCENTRATOR COMPANY
The Original Deister Co. Est. 1906
913 GLASGOW AVE. FORT WAYNE, IND.

"FEEDOMETER"—IT RECORDS AND TOTALS THE WEIGHT FED

It is a new development of the Hardinge Constant Weight Feeder that reads direct in tons, pounds or kgms. Bulletin 43.



HARDINGE
COMPANY, INCORPORATED · YORK, PENNSYLVANIA
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO

To Open California Gravel Deposit

C. R. BUTTERFIELD is planning to open a decomposed granite plant near Miraleste which is close to San Pedro, Calif. Approval of the plan was granted after arrangements were made so that trucks would not pass through residential areas of the city. The county regional planning commission is to hold a hearing on the application to operate the plant.

Build Crushing Plant for Defense Work

ERIN LIME AND STONE CO., INC., Erin, Tenn., is building a new stone crushing plant near Erin to furnish stone for ballast and road building for delivery to Milan, Tenn., where a government shell-loading plant is under construction. The Louisville and Nashville railroad will build a siding at the plant.

New Gravel Plant in Northwest

CONSTRUCTION of a sand and gravel plant has been started on Pierce Island, Wash. (see ROCK PRODUCTS, February, 1941, p. 92), contracts for the site being signed in the name of the Portland Gravel Co., Portland, Ore. It is reported that the new plant will be operating at full capacity filling several large contracts now on hand.

Agricultural Limestone

NELSON AND NIXON LIMESTONE CO., Cranberry, Penn., has opened a new crushing plant, near Oil City, Penn., for the production of agricultural limestone. The company, which has leased ten acres in a 14-ft. vein of limestone, produces three tons per hour and is equipped for bulk or bag deliveries.

New Retail Facilities

BREMERTON SAND AND GRAVEL CO., Bremerton, Wash., has leased city property for the establishment of retail facilities, including the placing of a bulkhead on the waterfront for landing barges. A rental of $75 monthly is to be charged.

New Ready Mix Plants

L. S. RANHORNE, INC., Hampton, Va., has started in the ready-mixed concrete business, with a fleet of six 2-cu. yd. Rex mixers on Ford chasses.

•

FRED A. HAYCOX, Norfolk, Va., has started operations in the ready-mixed concrete and asphalt road mix businesses.

Evaluating A Puzzolan

(Continued from page 56)

The ultimate reactivity of a puzzolan may readily be obtained with the autoclave. Trial additions of a puzzolan with hydrated lime are autoclaved and the decrease in the insoluble residue determined.

The rate of activity with strength gain, for any portland-puzzolan design, may readily be determined and compared on parallel specimens cured at two or more constant temperature ranges for like periods of time.

Puzzolanic action of silicates is influenced by chemical composition and curing temperature. Silicates having low or no alumina are slowly reactive at normal curing temperatures, but are highly reactive at elevated curing temperatures.

Siliceous materials containing comparatively high R_2O_3 contents do not show as concordant results between solubility and mortar strength tests as those siliceous materials with lower R_2O_3 content.

A desirable fineness of the selected puzzolan may be determined for any curing temperature by the outlined test for activity.

Grinding the puzzolan removes surface films from the particles and greatly accelerates activity.

Mineral Wool Convention

NATIONAL MINERAL WOOL ASSOCIATION held its annual convention in January at Cleveland, Ohio. M. L. Kuykendall, Insulation Industries, Inc., Detroit, Mich., was elected president. Other officers are E. R. Stevens, Baldwin Hill Co., Trenton, N. J., vice-president; and E. I. Williams, Riverton Lime and Stone Co., Riverton, Va., treasurer.

The new board of directors consists of J. R. Addington, American Rock Wool Co., Chicago, Ill.; L. M. Cassidy, Johns-Manville Co., New York, N. Y.; E. E. Wood, Jr., Therminsul Co., Kalamazoo, Mich.; Alan Hughes, U. S. Gypsum Co., Chicago, Ill.; G. E. Lortz, The Carey Co., Lockland, Ohio; Mr. Kuykendall and Mr. Williams.

Concrete Pavement Yardage

AWARDS of concrete pavement for January, 1941, have been announced by the Portland Cement Association as follows:

	Square yards awarded during January, 1941
Roads	2,813,517
Streets and alleys	1,321,320
Airports	831,804
Total	4,966,641

● *Changes in screening conditions increase PLAT-O's value to you. If your materials are wet one day, dry the next—or if you change products on the same screen . . . then you need PLAT-O!*

PLAT-O's selective throw is the simplest mechanism on the market today.

The off-balance flywheels are engineered with the whole screen so it is impossible to overload to a point where the throw is affected to any measurable degree.

If your materials change, or if you feel that either a stronger or a weaker throw could give you greater capacity or better grading or both, it is very easy to change the length of stroke.

DEMAND THESE FEATURES

• Opposed Elliptical Throw . . . Low Headroom, Accurate Grading, High Capacity • Selective Throw • Powerful Positive High Speed • Oil—Not Grease • Automatic Screen Cloth Tension—Each Deck Independently Changed • Vibration Fully Cushioned • Only Two Bearings • Lowest Power Requirements.

PLAT-O by DEISTER

DEISTER MACHINE COMPANY • FORT WAYNE, INDIANA

TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE

MODEL 51

BLAST HOLE DRILL

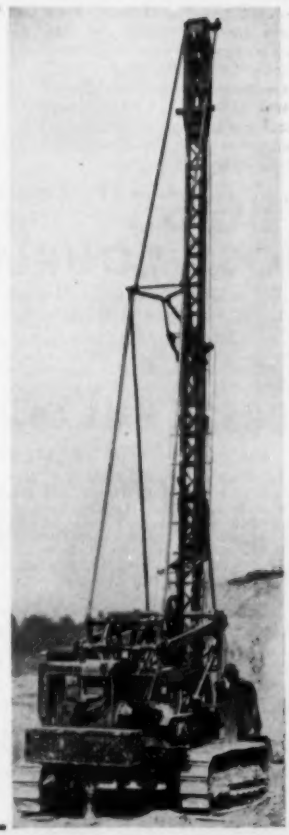
Is a new and better answer to one tough problem of quarry operators and rock cutting contractors.

It is a night-and-day rock fighter with more built-in power, shock endurance and work-wisdom than you have ever seen in a well drill up to now.

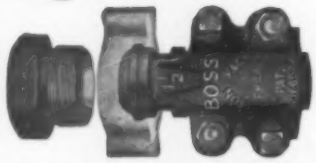
It has a welded and riveted steel frame, bigger shafts and bearings, distinctive tool-guide, power derrick-raiser, mast-head shock absorption, Keystone spudding system and stroke adjustment, dependable traction with convenient independent crawler control for easy steering and many other good features of design.

What makes a good blast hole drill? We print a booklet that tells the answer. It will interest you, make money for you. Ask for it.

KEYSTONE DRILLER CO.
Beaver Falls, Pa.



Washerless Leakproof.. and Built to "Take it!"



"GJ-BOSS"

GROUND JOINT STYLE X-34

HOSE COUPLING

When the service calls for hose couplings whose safety, efficiency and dependability cannot be questioned, the "GJ-BOSS" is the answer! Correctly designed to insure unequalled strength, durability and protection for hose ends. Ground joint construction eliminates all trouble and delays due to replacing lost or worn-out washers. Copper insert in spud fits rounded head of steel stem, forming soft-to-hard metal seal that remains leakproof, regardless of wear or the presence of abrasive particles. Application of strong 4-bolt malleable iron "BOSS" Offset Interlocking Clamp (on sizes 1" and larger; 2-bolt interlocking clamp on 7/8" and smaller) prevents all danger of blowoffs. Cadmium plated—rustproof. Sizes ½" to 4", inclusive.

"BOSS" WASHER TYPE STYLE W-16 HOSE COUPLING

Same as above except with washer instead of ground joint union between spud and stem. Sizes ¼" to 4" inclusive.

NOTE: Both "GJ-BOSS" and "BOSS" Coupling have malleable iron "COR-O-ZIG" stems on sizes 1¼" and larger corrugated steel stems on sizes 1" and smaller.

"BOSS" MALE COUPLING STYLE MX-16

The companion male coupling for both the "GJ-BOSS" and "BOSS" Female Couplings described above and with same clamps. More practical and economical than standard iron pipe nipple as it eliminates the need of oversize hose. Sizes 1¼" to 4" inclusive, with new *corrugated steel stems* on ½", ¾" and 1" sizes. (1¼" and larger have malleable iron "COR-O-ZIG" stems.)

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Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of February 15:

Central

65450. **Limestone,** ground or pulverized, C. L., min. wt. 60,000 lb. Establish on, from Hillsville, Walford and Shaw Junction, Penn., to Prenter, W. Va., 270c per net ton.

65453. **Stone, crushed, crushed stone screenings, agricultural limestone,** unburned, **agricultural limestone screenings** in bulk, in open top cars, C. L. (See Note 3). Establish on, from McVitty's, O., to Canton and Valley Jct., O., 138c per net ton.

65456 (2). **Lime,** common, hydrated, quick or staked, C. L., in bags, barrels, casks, iron drums, or in bulk, as per description in Agent Jones' Tariff 516-E. Establish on, to Alloy, W. Va., rates as follows: "A" refers to min. wt. of 30,000 lb.; "B" to min. wt. of 50,000 lb.—From Mosher, Mo., A 24, B 19; Ste. Genevieve, Mo., A 24, B 19; Hannibal, Mo., A 25, B 20; Quincy, Mo., A 25, B 20.

65505. **Limestone,** ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from White Bear, Mo., to Baltimore, Md., 545c; Harrisonburg, Va., 523c; New York, N. Y., 611c; Philadelphia, Penn., 567c; Washington, D. C., 523c per net ton.

65507. **Stone,** fluxing, furnace or foundry, melting or refractory (unburned) in bulk, C. L. Establish on, from Durbin, O., to Hamilton, O., 88c per gross ton.

65543. **Crushed stone, stone screenings,** in bulk in open top cars, straight or mixed C. L. Establish on, from Milltown and Marengo, Ind., to Buckskin, Elberfeld, Gudgel, Mackey, Rosebud and Somerville, Ind., 80c per net ton, via Sou. Ry., Oakland City, Ind., and N. Y. C. (C).

65544. **Limestone,** ground or pulverized, or **limestone dust,** unburnt, in box cars, straight or mixed C. L. , min. wt. 60,000 lb. Establish on, from Greencastle, Ind., to Evansville, Ind., 182c per net ton.

65545. **Sand,** in closed equipment, C. L. Establish on, from Gravel Pit, O., to Columbus, O., 99c per net ton.

65565. **Sand,** industrial, all kinds of equipment, C. L.; **sand** (except industrial), in closed equipment, or in open-top equipment with tarpaulin or other protective covering, C. L. Establish on, from Rockwood, Mich., to Columbus, O., 156c; Lancaster, Zanesville, O., 167c per net ton.

65575. **Sand, all kinds, and gravel,** C. L. Establish on, from Beaver, O., to Columbus, O., 110c per net ton, in box cars. (See Note 6.)

65579. (a) **Sand,** in all kinds of equipment; **sand** (except industrial) in closed equipment; **sand** (except industrial) in closed equipment; (c) **sand** (except industrial), in open top equipment (see Note 6), C. L. Establish on, from Beaver and Jackson, O., to Charlestown, Ind., (a) 220c; (c) 204c per net ton, via D. T. & I., Thrifton, O., B. & O.

65580. **Screenings, crushed stone,** in bulk in open top cars only and **stone,** crushed, in bulk in open top cars only, C. L. Establish on, from Narlo, O., to Cotton Hill, W. Va., 242c; Hinton, W. Va., 264c; Quinnimont, W. Va., 253c; Ronceverte, W. Va., 275c; White Sulphur Springs, W. Va., 286c per net ton.

65581. **Limestone, agricultural,** unburned, in bulk in open top cars only; **limestone, agricultural** (not ground or pulverized), in bulk in open top cars only; **stone, crushed,** in bulk in open top cars only, C. L. Establish on, from Narlo, O., to Anawalt, W. Va., 264c; Buffalo Creek, W. Va., 209c; Crum, W. Va., 220c; Hewlett, W. Va., 209c; Iager, W. Va., 253c; Kermit, W. Va., 220c; Naugatuck, W. Va., 231c; Panther, W. Va., 242c; Superior, W. Va., 264c; Wayne, W. Va., 209c; Welch, W. Va., 253c per net ton.

65591. **Screenings, crushed stone,** in bulk in open top cars only and **stone, crushed,** in bulk in open top cars only, C. L. (see Note 3) but not less than 72,000 lb. Establish on, from Narlo, O., to various points in W. Va., as follows: Apex 231c, Blue Creek 231c, Glendennin 231c, Elkland 242c, Etowah 220c, Glendon 253c, Jarretts Ford 220c, Pinch 220c, Rockton 253c, Strange Creek 253c, Upwood 242c, Villa Nova 253c, Walgrove 231c.

65592. **Agricultural limestone, unburnt** (not ground or pulverized), in bulk in open top cars, C. L. Establish on, from Narlo, O., to Williamstown, W. Va., 215c; Parkersburg, W. Va., 198c; Ravenswood, Millwood, W. Va., 209c; Flower, W. Va., 215c; Cairo, W. Va., 209c; West Union, Clarksburg, W. Va., 220c; Grafton, W. Va., 231c; Reedy, Spencer, W. Va., 242c per net ton.

65597. **Crushed stone,** in all kinds of equipment, C. L. Establish on, from Joliet, Ill., to South Bend, Ind., 111c per net ton.

65789. **Dolomite,** roasted (refractory dolomite, in granular form, treated or untreated, clinkered or burned to a dead state), C. L. Establish on, from Woodville, Gibsonburg, Bottsville, Millersville and Maple Grove, O., 248c per net ton.

65794. **Sand, all kinds, and gravel,** in open top cars, C. L. Establish on, from Overpeck, O., to Defiance, O., 149c per net ton.

65792. **Industrial sand,** as per usual descriptions a, b and c, also **gravel** from Phalanx, O., in open top equipment, C. L. Establish on, from M. & S. alleys Group

---

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason. No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

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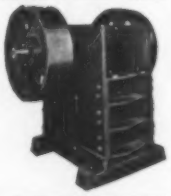

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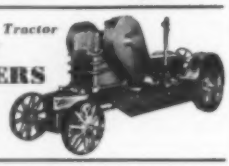

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points, viz.: Geagua Lake, Mahoning, Phalanx, Burnetts, Ohlton, O., Edenburg, Volant, Schollard, Leesburg, Greenville, Osgood and Henlein, Penn., to Beckley, W. Va., (a) 319c, (b) 351c, (c) 319c, and gravel 319c per net ton.

65596. **Stone, crushed,** in bulk, in open top cars, C. L. Establish on, from Speed, Ind., to Louisville, Ky., 45c per net ton.

Trunk

39551. **Sand** (other than industrial) and **gravel,** in open top cars without tarpaulin or other protective cover, C. L., and **sand** (other than industrial), in closed cars, or in open top cars with tarpaulin or other protective covering, C. L., (see Note 3) from Blossvale, Humaston and McConnellsville, N. Y., to Hamilton, Ohio, $3.63 and to Lockland, Ohio, $3.74 per net ton in lieu of current class rates. (See Note 5.)

39552 (shippers). (a) **Sand** (other than industrial) and **gravel,** in open top cars without tarpaulin or other protective covering, C. L.; (b) **sand** (other than industrial), in closed cars or in open top cars with tarpaulin or other protective covering, C. L., from Blossvale, Humaston and McConnellsville, N. Y.: Altoona, Penn., (a) $2.64, (b) $2.64; Chester, Penn., (a) $2.75, (b) $2.85; Corona, N. Y., (a) $2.97, (b) $3.08; Eddystone, Penn., (a) $2.75, $2.75; Farmingdale, N. Y., (a) $3.30, (b) $3.41; Hasbrouck Heights, N. J., (a) $2.20, (b) $2.31; Middle River, Md., (a) $2.97, (b) $2.97; North Hawthorne, N. J., (a) $2.20, (b) $2.31; Philadelphia, Penn., (a) $2.75, b() $2.75; Reading, Penn., (a) $2.75, (b) $2.75; York, Penn., (a) $2.64, (b) $2.64; Fairfield, Conn., (a) $2.64, (b) $2.64. (See Note 5.)

Southern

24739. **Limestone,** ground or pulverized, C. L., min. 60,000 lb. Establish to Charlestown, Ind., from Kosmosdale, Ky., 94c and Stephensburg, Ky., 138c net ton.

24745. **Ground limestone and marble,** C. L. Establish 175c net ton—Cartersville, Ga., to South Atlantic ports for transshipment to Pacific coast.

24752. **Sand,** C. L. Establish 80c net ton—Diamond, Lake Wales, Concrete and Independent, Fla., to S. A. L. stations, Parkers, Fla., through Gulf Port, Fla. Highway competition.

24801. **Stone,** crushed, C. L. Establish 120c net ton, Cedar Bluff, Ky., to Bolivar, Tenn.

24894. **Mica and mica schist,** C. L., min. 60,000 lb. Establish 25c cwt., Johnson City, Tenn., and Clinchfield R. R. stations in N. C., Huntdale to Thermal City, incl., to Port Wentworth and Savannah, Ga.

24919. **Sand and gravel,** C. L. Establish 75c net ton, Hattiesburg, Miss., to Pascagoula, Miss. Rate to include switching at Hattiesburg but not to include switching at Pensacola — to expire 6 months from effective date.

24926. (a) Establish 625c gross ton on **crude phosphate rock,** C. L., from origins named in Item 2301 of S. W. L. Tariff 114-I, to Shreveport, La. (b) Cancel present on phosphate rock from Fla. mines to Barksdale Field, La., account that point within switching limits of Shreveport, La.

Illinois

IRC 6535-4. **Silica sand,** C. L., (see Note 3), but in no case less than 40,000 lb., from Ottawa, Ill., to East Fort Madison, Ill. Present, $2.08 net ton. Proposed, $1.60 net ton.

IRC 7233-2. **Sand, gravel,** C. L., from Plainfield, Ill., to Elwood, Ill. Present, 95c ton. Proposed, 60c ton, to expire with Dec. 15, 1941.

E-41-283 (redocketed). **Limestone,** ground, C. L., from Omaha, Neb., to Detroit, Mich. Rates, present, $6 per ton (Chicago combination). Proposed, $4.50 per ton, min. wt., present, 40,000 lb., to Chicago, and 50,000 lb. beyond; proposed, 60,000 lb.

E-41-442. **Limestone,** crushed or ground, C. L., (see Note 3), but not less than 40,000 lb., from Linwood, Ia., to St. Paul, Minneapolis and Minnesota Transfer, Minn. Rates: Present, 13c per 100 lb. Proposed, 10c per 100 lb.

Illinois

IRC 6947-2. **Stone,** broken, crushed or ground, C. L. (see Note 3), but in no case less than 54,000 lb.:

To	(1)	(2)	(3)	(4)
LaGrange	72	68	72	68
Canton	11	68	77	75
Fenway	88	75	88	75
Gregory	88	75	88	81
Alexandria	88	81	88	NC
Hannibal	55	NC	77	55
West Quincy	55	NC	66	55

(1) Present, from Quincy, Ill.; (2) proposed, from Quincy, Ill.; (3) present, from Marblehead, Ill.; (4) proposed, from Marblehead, Ill. NC—No change.

Southwestern

39530. **Sand,** industrial, in open top cars without tarpaulin or other protective covering, in C. L. (see Note 3), from Cleveland, N. Y., to Painted Post, N. Y., $1.76 per net ton in lieu of current 6th class rate of $3.80 per net ton. (See Note 5.)

Texas-Louisiana

5510. Establish the following rates on **sand, gravel, crushed stone,** asphalt coated stone, rock, asphalt, C. L., to Genoa and Olcott, Texas (see Notes 1 and 2): From Dolman 66c, Klimek 66c Leevan 81c, Dittlinger 106½c, Ogden 106½c, New Braunfels 106½c, Victoria 84c, Hooper 106½c, Carley 86c, Blewett 152½c, Dabney 152½c, Whitesmine 152½c.

Note 1—Proposed rates to apply only on materials for use by the U. S. Government in constructing Ellington Field.

Note 2—On request establish from other origins to Genoa and Olcott the same rates which were established to Houston to meet the shell barge-truck competition.

New England

53528. **Sand, gravel and crushed stone,** min. wt. marked capacity of car, except that when cars are loaded to cubical or visible capacity, actual weight will apply, from Libby's Pit (Leeds Jct.), Me., to Bath, Me. Present—77c per net ton. (Me. C. I. C. C. C.-4509); proposed—66c per net ton. Reason: To establish a commodity rate comparable with other commodity rates now in effect.

Florida Phosphate Rates

AN I.C.C. EXAMINER in a proposed report, fourth section application No. 18550, on phosphate rock from Florida mines to Atlantic ports, has recommended that railroads be granted relief to establish and maintain over their all-rail routes from shipping points in Florida rates of not less than $3.75 a long ton to Norfolk and Newport News, Va., and Wilmington, N. D., and $4.15 to Richmond. He also recommended that the present higher rates from and to intermediate points be maintained. Rate changes recommended are to apply on phosphate rock, other than ground phosphate rock, slush and floats and soft phosphate in carloads.

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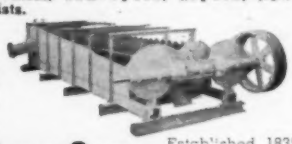

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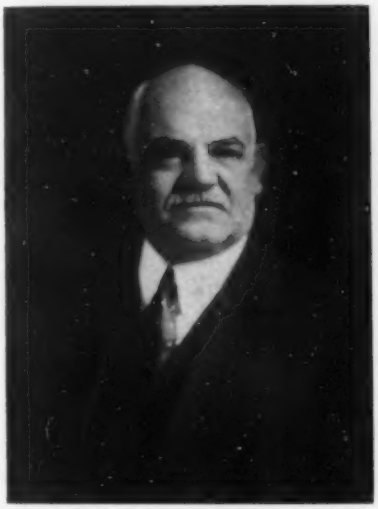
OBITUARIES

THOMAS J. DUFFY, superintendent of the Ohio River Sand Co., Louisville, Ky., in charge of dredges and at one time president of the company, died January 19 at the age of 65. Mr. Duffy was one of three sons of Captain J. T. Duffy, who in 1891 founded



Thomas J. Duffy

the Ohio River company with Pal C. Barth and J. M. Settle, the present head. Thomas J. Duffy succeeded his father as president when he died in 1906 and was president until 1929.

•

JOSEPH RIORDAN, works manager and superintendent of the Santa Cruz Portland Cement Co. plant at Davenport, Calif., died February 12 at the age of 52. Mr. Riordan started working for the Santa Cruz company in 1907 as a chemist. In 1929 he was promoted to assistant superintendent and in 1933 he became superintendent and works manager.

•

HARRY C. HUFFSTETTER, president of the Brown-Huffstetter Material Co., Indianapolis, Ind., and first president of the Indiana Sand and Gravel Producers Association, died January 18. He was 80 years of age.

•

C. R. MESSINGER, president of Chain Belt Co., Milwaukee, died February 4, at the age of 58. He also was chairman of the boards of Oliver Farm Equipment Co., Chicago, and Sivyer Steel Casting Co., Milwaukee, and was director in several other companies.

•

BERT L. CHAMBERLIN, owner of the Paramount Sand Co., Cleveland, Ohio, and Cleveland representative for the Albany Sand & Supply Co., Albany, N. Y., died January 26 at the age of 59.

•

JOHN A. COOK, president of the Lansing Sand and Gravel Co., Lansing, Mich., died January 19 at the age of 64.

•

EDWARD P. CONNELL, secretary-treasurer and general manager of the Falk Corporation, Milwaukee, Wis., died February 8 at the age of 56. He had been with the Falk Corporation for 28 years, starting as an accountant and later serving as purchasing agent and comptroller.

Industrial Sand Reports on Production Capacity

Following up the request of the National Defense Advisory Commission, President Hansen of the National Industrial Sand Association advised H. Herbert Hughes of the Bureau of Research and Statistics of the commission in a recent letter that a tabulated summary of the replies received from the industry on production capacity had been compiled and sent in for interpretation. The tabulated summary showed that the total production in 1940 was 7,385,603 tons, and the estimate of easy annual capacity was 16,221,156 tons which could be very materially increased more than ample for any demand that might grow out of the defense program. President Hansen pointed out that the significant point of the survey is that production of industrial sand in 1940, one of the heaviest tonnage years in the history of the industry, was only about 45 percent of the easy capacity of the industry.

Executive Secretary V. P. Ahearn has announced that the annual convention of the National Industrial Sand Association will be held at The Homestead, Hot Springs, Va., June 19 and 20.

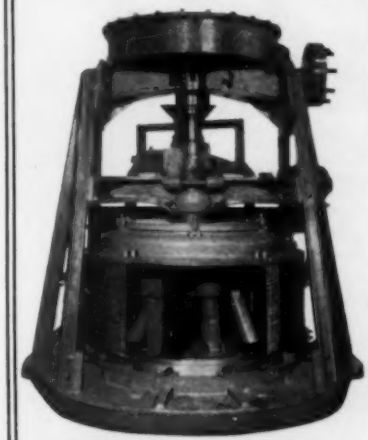
COMING CONVENTIONS

National Concrete Burial Vault Association, Stevens Hotel, Chicago, May 13, 14 and 15.

National Lime Association, The Homestead, Hot Springs, Va., May 28 and 29.

American Society for Testing Materials, Palmer House, Chicago, June 23 to 27.

AGRICULTURAL LIMESTONE PULVERIZERS



JUNIOR HERCULES MILL
The most popular Agricultural Limestone Pulverizer

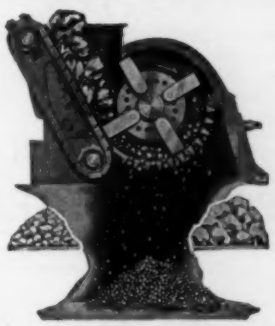
Sturdy and Efficient

Low initial cost—Low power consumption and operating costs.

Write for catalog.

BRADLEY PULVERIZER CO.
Allentown, Pa.

A New High Degree of Crushing Efficiency



More production — more profit —lower operating and maintenance costs. All these are features of DIXIE performance.

Simple in design, yet sturdy in construction, DIXIE NON-CLOG and regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note particularly the continually moving breaker plate which means that DIXIE Hammermills will outlast and out-perform any other type.

Write for complete details on DIXIE'S 40 sizes.

Dixie Machinery Mfg. Co.
4109 Goodfellow Ave. ST. LOUIS, MO.

Spring Fever?

Not with Universal Vibrating Screens on the job in your plant

Now is the time to make sure your plant is ready for that rush of spring and summer business. UNIVERSAL is the answer to your screening problems. Their amazingly low cost, efficiency and dependability provide the solution to your most difficult screening problem.

Write for illustrated literature—today! No obligations whatever.

UNIVERSAL VIBRATING SCREEN CO.
RACINE-WISCONSIN

Something NEW!

THE SCHAFFER POIDOMETER

WITH

MOTOR OPERATED REGULATING GATE

Write for Bulletin No. 2-A and get complete profit-producing facts!

Schaffer Poidometer Co.
2828 Smallman St. PITTSBURGH, PA.

New Incorporations

Ready-Mix Concrete Co., Orange, Tex., has been incorporated by R. C. Doors, George Masterson and C. H. Steele. Capital stock is $4000.

Service Concrete Corp., 701 S. Sharkey street, Muncie, Ind., has been granted a charter at 1000 shares no par value stock. Incorporators are Howard H. Hoffman, Frances M. Hoffman and Ralph E. Fullhart.

Bennett Concrete Stone Co., Cleveland, Ohio, has been incorporated with a capital of 500 shares no par value by H. P. Bennett, Lewis H. Bennett and Laura Dornback. H. B. Howells, Williamson Bldg., is agent.

Franklin Sand & Stone Co., Inc., Franklin Square, N. Y., has been granted a charter with a capital of $10,000. Maurice R. Goldberg, 160 Jamaica Ave., Jamaica, New York, N. Y., is agent.

Refractories, Inc., is the name of a new Woodville, Ohio, concern. Authorized capital is $50,000. Fred Witmer, Sr., president, and E. H. Mauntler, secretary, of the Ohio Hydrate & Supply Co., will be officials of the new firm. Frank C. Eickemeyer is agent.

Sullivan Highway Products Corp., Monticello, N. Y., has been incorporated with a capital of $100,000. Agent is Blake Washington.

Manufacturers' News Notes

Western Precipitation Corp., Los Angeles, Calif., began the new year by calling all branch managers, sales personnel and engineers to a meeting at the Los Angeles office. Sales and technical problems were discussed. The new Turbulaire dispersion dryer was demonstrated. The new 9-VP Multiclone, made entirely of 3/16-in. steel and cast iron, was demonstrated, and an entire day was spent discussing the alkali situation in the cement industry and its effect upon relative recoveries with Cottrells, Multiclones, or Impax separators.

W. W. Sly Mfg. Co., Cleveland, Ohio, reports that its employes paid a splendid tribute to President S. C. Vessy recently by presenting him with a handsome scroll signed individually by some forty of his closest associates, in recognition of his 75th birthday, February 3. He has been president for the past 20 years.

Caterpillar Tractor Co., Peoria, Ill., announces that Donald A. Robison has been made a vice-president with administrative direction of all selling and advertising activities and is succeeded as general sales manager by Gail E. Spain. Since 1938 Mr. Spain has been manager of the sales development division.

Timken Roller Bearing Co., Canton, Ohio, announces the appointment of George W. Curtis as the Milwaukee division manager. Since 1930 he has been district manager of the company's industrial division in Milwaukee.

Giles and Ransome, Philadelphia, Penn., equipment dealers, announce that Charles J. O'Brien is now a member of its sales organization. He was formerly service and sales engineer with the Blaw-Knox Co., in the eastern part of the United States and had been with that company for 11 years.

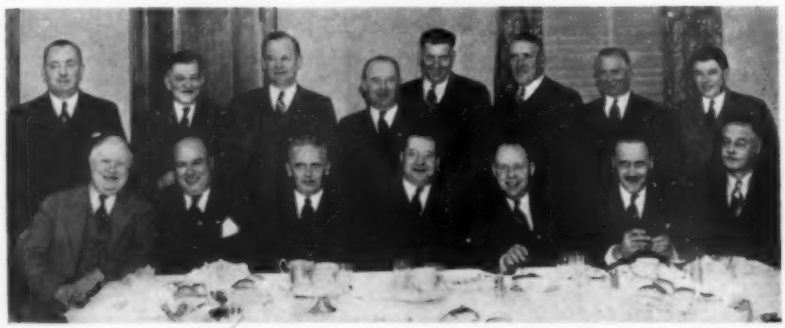
General Electric Co., Schenectady, N. Y., recently announced seven new appointments. J. J. Curtin is in charge of magnet wire sales at Fort Wayne, Ind., replacing B. F. Ilsley, who moved to Schenectady to become general assistant to W. V. O'Brien, division manager of wire and cable. O. F. Vea has succeeded Mr. Curtin and is in charge of sales promotion and publicity work in the motor division of the industrial department. P. A. McTerney has been appointed manager of sales, large motor and generator division of the industrial department. G. L. Irvine will manage the newly formed apparatus agency sales section. G. E. Cassidy has been appointed engineer of the general applications section, another newly formed section, and J. S. Overstreet has been placed in charge of wire and cable sales.

P. A. McTerney

Haynes Stellite Co., a unit of Union Carbide and Carbon Corp., New York, N. Y., announces the appointment of Robert L. Lerch as general sales manager. Since 1929 he had been advertising manager and assistant to the general sales manager.

Hendrick Manufacturing Co., Carbondale, Penn., has opened a Baltimore sales office in the Hearst Building. The new sales office will be under the supervision of B. F. Gardner, who has been with Hendrick for many years at its Carbondale plant.

SKF Industries, Inc., Philadelphia, Penn., is erecting an addition of 56,200 sq. ft. of manufacturing floor space to its plant No. 2. A two-story brick addition enclosing 12,000 sq. ft. is also being erected at plant No. 1.



Field representatives of Diamond Iron Works, Inc., at the annual sales convention held recently in Minneapolis. Top row in the usual order: R. C. Scott, J. M. Dennis, W. E. Wright, newly appointed sales engineer, L. E. Cole, A. B. Hanse, F. B. Blancett, recently transferred to the East Central territory, E. J. Towey, and G. S. Gillespie. Bottom row: J. A. Nable, C. T. Johnson, W. H. Riddell, H. S. Smith, E. F. Salmonsen, and Fred Freeman

WILFLEY
centrifugal SAND PUMPS

for Slurries, Sand Tailings, Slimes, Acid Sludges

Save Pumping Costs

Continuous operation without attention for long periods. Stuffing box, stuffing, gland water ALL eliminated. Close clearances maintained by easy slippage seal adjustment. Heavy pumping parts of material best suited for YOUR particular problem. Complete engineering service. Prompt shipment of parts. The most efficient and economical pump you can buy. *Write for Complete Catalog*

A. R. WILFLEY & SONS, Inc., Denver, Colo., U. S. A.
NEW YORK OFFICE: 1775 BROADWAY

"PENNSYLVANIA" REVERSIBLE HAMMERMILL

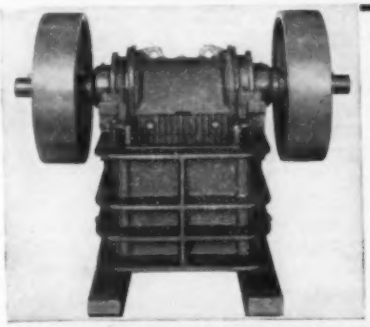
preparing 42" Gyratory's output of hard Limestone to size required for the efficient performance of modern Grinding Equipment.

Major crushing by smashing impact,—Automatic Hammer Turning and Resharpening,—Lower Power Demand,—and Sharply cut upkeep cost.

Send for Bulletin No. 1030.

PENNSYLVANIA CRUSHER COMPANY
Liberty Trust Bldg.
PHILADELPHIA, PA.

PUT YOUR REDUCTION PROBLEMS UP TO US



Quick and Easy Adjustment for Various Sizes ....The DAY JAW TYPE CRUSHERS

Ask for details of this famous Crusher that has proved "You can't go wrong in a DAY."

Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE

HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
202-204 Church Street
New York, N. Y.

Classified Advertisements

CLASSIFIED RATES

POSITIONS WANTED — POSITIONS VACANT Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION—Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $5.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

FOR SALE

8-b Telsmith primary crusher high speed shafts and roller bearings. Good condition.
Robins 2x4 single deck vibrating screen price $100.00; Direct connected 6" Aurora centrifugal pump with 50 H.P. G.E. motor. Price $400.00.

COOGAN GRAVEL COMPANY
805-b Lehman Bldg. Peoria, Ill.

FOR SALE

1—12-yard Scraper
1—80 Cletrac—diesel
1—Northwest No. 4 Crane 50-ft boom

JOHN W. PATTERSON CO.
324 4th Ave., Pittsburgh, Pa.

New—RAILS—Relaying
ALL SECTIONS

Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos, frogs and switches. Attractive prices quoted. Wire, write or telephone for quotations.

M. K. FRANK
480 Lexington Ave. New York, N. Y.
25 St. Nicholas Building Pittsburgh, Pennsylvania

FOR SALE

1 Novo Gasoline Hoisting Engine, 45 HP double drum, mounted on truck for moving. Good Condition.
1 Sauerman Dragline Crescent Scraper, ½ yard.

HOPE BRICK WORKS
P. O. Box 389 Hope, Arkansas

FOR SALE

Slackline outfit complete, in excellent condition. Consisting of 100 H.P. slip ring motor—two speed hoist—80 foot all steel mast—one 2 yd. bucket—one 1⅛ yd. bucket. Price $5000.00.

R. W. ROBINSON
P. O. Box 603, Austin, Texas

IMMEDIATE SHIPMENT!

20—25 Ton Steam and Gasoline Loco. Cranes.
6 to 30 Ton Gasoline Locomotives, 36" & Std.
1 Yard Speedcrane—Shovel-Crane-Dragline.
P & H No. 600 1 yd. Gas Crawler Crane, 50' boom.
2700 ft. Ing. Rand Motor Driven Compressor.
60, 120, 180, 200, 350 HP Diesel Engines.
7" and 10" Newhouse Gyratory Crushers.

MISSISSIPPI VALLEY EQUIPMENT CO.
515 Locust St. St. Louis, Mo.
Have you Anything to Sell?

FOR SALE
IMMEDIATE DELIVERY

Used Equipment

5—Pitman assemblies for 10 x 20 jaw crusher, bearings S.K.F. type.
1—10 x 20 roller bearing DIAMOND jaw crusher equipped with Timken bearings.
2—10 x 36 Pitman assemblies for 10 x 36 jaw crusher.
1—15 x 36 Pitman assembly complete.
1—20'0" bucket elevator with buckets 10" x 6" x 7½" mounted on chain.
1—30" x 10'0" double shaker screen.
1—9 x 36 stationary jaw Patt. No. 9531.
1—Rebuilt Allis-Chalmers power unit Model U-40, completely reconditioned.
1—Revolving Screen 66" x 20'0".
1—Grizzly and hopper and plate Feeder.
1—Grizzly and hopper.

New Equipment

1—6"x16" bronze bearing DIAMOND jaw crusher complete with flywheels and Model P2877D2 LeRoi motor mounted on trailer unit with steel wheels.
2—Pitman assemblies with S.K.F. bearings including main bearings for 10" x 20" jaw crusher.
1—15" x 36" roller bearing DIAMOND jaw crusher.
1—15 x 36 Pitman assembly—new design with 8" shaft, including main bearings.
1—Bucket elevator 32'0" centers, rigid type, with buckets 12" x 6" x 7¾" mounted on belt.
2—Quarry plants with 10 x 20 anti-friction bearing jaw crushers and bucket elevators, mounted on trucks with four steel wheels.
2—30 cubic yard bins, 3-compartment, no jack legs.
1—4'0" x 8'0" triple deck vibrator screen arranged to hang by cables.
1—No. 25 hog., anti-friction bearing type with cast steel discs.
6—Steel wheels 40" dia. x 16" face to take 4" Hyatt bearings.
4—Steel wheels 40" dia. x 10" face to take 4" Hyatt bearings.
4—Steel Wheels 28" dia. x 4" face bore 1⅞".
10—Steel wheels 28" dia. x 5" face, bore 1-15/16".
8—Steel wheels 24" dia. x 3½" face, bore 1⅞".
4—Steel wheels 28" dia. x 14" face, bore 4" Hyatt.

SPECIAL PRICES FOR QUICK SALE

DIAMOND IRON WORKS, INC. AND MAHR MANUFACTURING CO. DIV.
MINNEAPOLIS MINNESOTA

FOR SALE

18 Vertical Kilns
Clyde Hydrator
Quarry car hoist and motor
Kiln car and hoist
Machine shop equipment
3 Pumps
Conveyors (Screw and Bucket)
Screens
Hammer Mill
2 Boilers
Air Compressor
Steel storage Tanks
Transformers

Address Box 973, Care of Rock Products, 309 W. Jackson Blvd., Chicago, Illinois.

Bucket Elevators: Enclosed—Continuous—Spaced 24"x60', 20"x40', 16"x60', 14"x50', 14"x32', 12"x35', 10"x35', 8"x32', 5"x14'.
Crushers: 4x10, 9x15, 9x16, 12x18, 12x20, & 24x36. Gyratorys—No. 25 Kennedy & 8" Traylor.
Screens: 12 Hummer Vibrating with V16 heads 120 New Hummer TonCap 3x5 & 4x5 Wire Mesh 3x5' 1-deck Multirap Vibrating with washer 2x8' 1-deck Linkbelt Vibrating, feed gate 4x8' 2-deck Robins "Perfex Shaking Types 3'x16' and 4'x21' Revolving Types
Railway Equipment:
1000' of 24"-g. Track, Curves and Switches
12—24'-g. Atlas Cars, ½-yard End Dump
5—24"-g. Easton Cars, 1¼-yard V-shaped
12—24"-g. Koppel Cars, 1-yard V-shaped
8—36"-g. Koppel Cars, 3-yards V-shaped
2—30"-g. Mercury Battery Locomotives, 45-v
36"-g. Vulcan Gasoline Locomotive, 4-ton
36"-g. Plymouth Gasoline Locomotive, 7-ton
36"-g. Whitcomb Gasoline Locomotive, 8-ton
Belt Conveyors:
16"x20' Jeffrey & 18"x44' Portable Types
Trough & Return Idlers for 12"—30" Belt
150 Head & Tail Pulley Conveyor Assemblies
100-ft. 30" Gravity Rolls, 10' sections
300-ft. 30" Nearly New 5-ply rub. cov. Belt
850-ft. 36" Nearly New 6-ply rub. cov. Belt
Feeders—24"x7' Plate & 36" Apron Type
2 Magnetic Belt Pulleys for 14" wide Belt
Other Equipment:
Storage & Pressure Tanks.—Truck Scales
Bin Gates—18x18, 16x16, 12x12 lever type
Loomis Clipper Blast Hole Drill, gasoline
1-yd. Ransome Mixer, with Waukesha engine
Gasoline Engines—3, 7, 12, 25 & 50-hp.
Dragline Buckets—½, 1, 1¼-yard capacity
Clamshell Buckets—¾, 1, 1½-yard capacity
10 Centrifugal Water Pumps, Gas & Electric

G. A. UNVERZAGT
15 PARK ROW NEW YORK CITY

LOOK—SPECIAL!

1—Louisville 6'x40' Dryer.
1—Allis-Chalmers 6'x60' Dryer.
1—1¼ Yd. P & H "700" Dragline
2—¾-Yd. Bucyrus-Erie Steam Shovels.
1 Each—15-20-25 Ton Industrial Works, 8-Wheel Locomotive Cranes.

ALSO

Jig Screens, Crushers, Pulverizers and Compressors.

W. M. SMITH & CO.
BIRMINGHAM, ALA.
LOW PRICES PROMPT DELIVERY

FOR SALE

Steel Stiffleg Derrick, 80 ft. boom
Lambert Electric Hoist for this Derrick.
1 Yd. Haiss Clamshell Bucket.
16x36 Worthington Crushing Rolls.
1 Climax & 1 Waukesha Gasoline Power Unit.
Lots of 220 Volt AC Motors; 3 to 50 HP.
Lathe, Drill Press, Gould & Eberhardt Shaper.

Address Box 984, Care of Rock Products, 309 West Jackson Blvd., Chicago, Illinois

CRUSHERS

GYRATORY: 42" Gates K. 30" Superior McCully (Like new). 20" Superior McCully. Gates Nos. 12, 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 6, 5, 6, 8C, 9 & 16. Also many Austins, Kennedys and Traylors, many sizes.
JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.
REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 30" TZ, 8", 10", 12". Super. McCully 6" & 16". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.
ROLLS: Allis-C. 12¼x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc., Etc.
HAMMERMILLS: Williams No. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.
MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x8 & 10x9. Hardinge 6'x3', 8'x30' & 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.
CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Eetc, in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

ALEXANDER T. McLEOD
7229 Rogers Avenue CHICAGO

USED BARGAINS

12-Ton Plymouth Standard Gauge Locomotive

2-Yard Sauerman Heavy Weight Scraper with No. 2500 Hoist

Allis-Chalmers Model LO Tractor with 7-Yard Scraper and Hydraulic Bulldozer

All in rebuilt condition

H. B. FULLER EQUIPMENT CO.
1836 Euclid Ave.
Cleveland, Ohio

RAILS—1 Ton or 1000

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—New—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money.
'Phone, Write or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

All Down the Line . . .

Every last man in your plant can profit by reading ROCK PRODUCTS regularly. It will help him to bring new interest and new efficiency to his job.

Rock Products

309 W. Jackson Blvd.
Chicago, U. S. A.

We produce:

- ☐ Crushed Stone
- ☐ Sand & Gravel
- ☐ Glass Sand
- ☐ Lime
- ☐ Sand-Lime Brick
- ☐ Gypsum
- ☐ Phosphate
- ☐ Cement
- ☐ RMC
- ☐ Con. Prods.

Other Materials.....

We retail.....

See to it that ROCK PRODUCTS reaches you regularly—and pass it around! Subscriptions for the keymen would be mighty good investments.

Date....., 1941

Please enter my subscription to ROCK PRODUCTS for.....year..

(two years $3.00, one year $2.00), for which we enclose $.....

Name.....

Street.....

City.....State.....

Canada $2.00. Foreign Subscriptions $4.00 a year

Really Rebuilt Equipment at Bargain Prices

All of the equipment listed below by us may be inspected in one of our Rebuilding Plants

AIR COMPRESSORS
Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

BINS
12—1 150-ton Johnson, 3 comp., 1 120-ton Blaw Knox, 4 comp., and the following 2 comp. bins, 2 118-ton Blaw Knox, 1 117-ton Blaw Knox, 2 72-ton Blaw Knox, 1 75-ton Butler, 1 60-ton Butler, 1 51-ton Blaw Knox, 1 35-ton Blaw Knox, 2 30-ton Johnson. Above with or without weigh batchers.

BUCKETS
26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.
6—Dragline; 1—1¾ yd. Northwest; 3—1½-yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page.
1—1½ yd. Pioneer Cableway Excavator bucket.
7—Drag-scraper; 2—1 yd. Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst.

CRANES, DRAGLINES and SHOVELS
1—Link-Belt, K-55, Serial No. 1698, 70' boom, 2-yd. bucket, also have 2 yd. shovel attachment.
1—Link-Belt K-48, Serial No. 1728 with 60' boom 2 yd.
1—Northwest Model 5, Serial No. 3572 with 50' boom, 1½ yd.; also pull shovel 1¾ yd. and
3—Northwest Model 4, Serial No's. 3441, 3445, 3495 with 40' boom 1 yd.; also 1-yd. pull shovel.
1—Bucyrus Erie 1½ yd., 33-B, A.C. electric tunnel shovel.
1—Northwest Model 104, Serial No. 2079, 45' boom, 1½ yd. bucket; with 1 yd. shovel attachment.
1—Link-Belt Model K-42, Serial No. 1265, 45' boom, 1¼ yd. bucket, also 1 yd. trench hoe attachment or 1¼ yd. shovel front.
3—Northwest Model 105, Ser. Nos. 2556, 2953, 1645, 40' boom, 1 yd. bucket with one shovel attachment.
1—Bucyrus Erie Model 1035, Ser. No. 11034, 50' boom with 1 yd. bucket.
2—Osgood Heavy Duty, Serial No. 2069 and 2087, 40' boom, 1 yd. bucket and with 1 yd. shovel attachment.
1—Thew ⅝ yd. Gasoline Shovel with ¾ yd. shovel front and 40' crane boom. Serial No. 2891.
1—Koehring Model 301, Serial No. 544, 40' boom ¾ yd. bucket.
1—Northwest No. 2 crane, new 1937 with 40' boom.
1—Byers Bearcat Model 27, Serial No. 5289, 30' boom, ½ cl. sw., ½ yd. bucket.
1—Erie Steam Crane Shovel with 40' crane boom, with or without ¾ yd. shovel front.

ROCK DRILLS
With any style mounting, wagon, column or tripod.
22—Ingersoll Rand Models X71, Weight 220 lbs. 8-70 wght, 185 lbs. R72 wght. 175 lbs. for 1⅛" steel.
10—Sullivan Models FG-2, Wght. 250 lbs. for 1½ steel, Mod. TJ-10, Wght. 161 lbs. for 1⅛" steel.
1—Gardner Denver Model 17, Wght. 180 lbs. for 1¼ steel.

JACK HAMMERS
53—Jackhammers for 1" and ⅞" steel—Ing. Rand Models S49, DCR23, Gardner Denver Mod. 37 and 11 D.
Also riveting and chipping hammers. Paving breakers, drills and reamers, grinders, etc.

CRUSHERS
5—Gyratory crushers; 1—No. 5 Allis-Chalmers; 1—No. 5 Austin; 1—No. 5 Gates; 1—No. 3 McCully; 1—No. 0 McCully.
10—Jaw Crushers; 3—15x36" Universal; 1—15x36" Cedar Rapids; 1—15x26" Champion; 1—12x20" Acme; 2—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9A; 1—9x15" Champion.
1—Set of Allis-Chalmers, smooth type crushing rolls, 42x16".

DREDGE PUMPS
1—12" Morris Heavy Duty D. C. 6x 100 H.P. dbl. cyl. steam engine.
3—Belt Driven; 3—Morris Mang., 1—10", 1—8", 1—6".

HOISTS
1—2 Yd. Thomas 2 speed Class L Cableway excavator hoist with 150 HP electric motor.
1—National 50 HP dragscraper hoist for handling 1 yd. bucket with 50 HP electric or gas power.
1—1 Yd. Cedar Rapids 2 speed drag-scraper hoist with 50 HP electric or gas power.
1—1 Yd. Kern variable speed drag-scraper hoist powered by 50 HP electric motor.

LOCOMOTIVES
15—Electric and gas power standard 36" and 24" ga.; 1 22-ton Plymouth, 1 12-ton Plymouth, standard ga., 1 7-ton Plymouth, 4 7-ton Whitcomb, 1 6-ton Brookville, 1 6-ton Whitcomb, 2 4-ton Vulcan, 2 4-ton Whitcomb, 1 3½-ton Plymouth, 1 3-ton Whitcomb.

PLEASE SEND FOR A COMPLETE STOCK LIST

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA—1506 Race St. Phone: Rittenhouse 4064
CHICAGO—1119 So. Washtenaw Ave. Phone Nevada 2400
PITTSBURGH—P. O. Box 933. Phone Federal 2000

CONCRETE PLANTS—EQUIPMENT
Ready-mixed concrete batching plant, 5 compts., 1000 yds. aggregates, 750 bbls. cement, automatic weigh batcher, full electric or manual.
225 tons, 4 compt. bin, weigh batcher.
Butler 100 yd. 3 compt. bin, weigh batcher.
2–115 tons Johnson bins, 2 compt.
Beaumont 42 yd. two compt. bin.
MultiFoote 27-E paver, with 40 ft. tower.
200 ton rock storage bin, steel, heavy construction.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Jaeger Lakewood 2 yd. concrete mixer, electric.
Smith 1 yd. tilting mixer, electric.
Ransome 1 yd. mixer, electric, practically new.
Barber Greene 24" reciprocating feeder.

BUCKETS—STONE SKIPS
22—Steel stone skips, 2 to 3 yds.
1½ yd. heavy duty Blaw Knox digging bucket.
1¼ yd. heavy duty Blaw Knox, digging, clamshell.
1½ yd. Hayward rehandling clamshell.
1 yd. Hayward clamshell, rehandling.
⅝ yd. Hahs rehandling, clamshell.
1 yd. Hayward orange peel, 4 leaf.
⅝ yd. Hayward orange peel, 3 leaf.

SHOVELS—CRANES
2—Marion Diesel shovels, 1—⅝ yd. cap.
No. 50 Bucyrus Erie steam shovel, 2 yds. cap.
Bucyrus Erie electric tunnel shovel, 1 yd. cap.
Northwest 1 yd. comb. shovel-crane, gas.
Browning loco. crane, steam, 25 tons.
Brownhoist 10 ton crane, gas, 40 ft. boom.

TRACTORS
RD-8 Caterpillar, with bulldozer.
RD-7 Caterpillar, with bulldozer.
Allis Chalmers Model 25, with bulldozer.
Caterpillar Model 30, with L.P. bulldozer.

LOCOMOTIVES—CARS
Plymouth 24 ton, gas, standard gauge.
2—Whitcomb 4½ ton, gas, standard gauge.
2—Plymouth, 20 ton, Diesel, 36" gauge.
8—3 yd. V type 36" ga. side dump cars.

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Gyratory crushers: K.V.S. 30, 37-S, 40; Telsmith 32, 8A, 8B; Traylor 8"; McCully 13", 8", 6".
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 15x30, 16x32, 36x48, 42x60.
Complete portable rock crushing plant, nearly new, with crusher, elevator, screen, etc.

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1—2' Telsmith Cone Crusher
1—6" Traylor Finishing Crusher
1—1020 Good Roads Roller Bearing Jaw Crusher
2—Sets 16" x 16" New Holland Roll Crushers
1—Jeffrey Hammer Mill
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1—Model 42 B-G. Bucket Loader

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BLUE BALL, PA.

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1—15, 20 and 25 tons capacity.

DRYERS
1—6x60. 1—8'6"x86 and 1—8'8"x60.

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1—30" dia. 30" face 100 H.P.
1—60" dia. 36" face and
1—72" dia. 30" face with 150 H.P. motors.
1—78" dia. 72" face with 300 H.P. motor.
All AC 2200-440 volt motors.

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1—Full revolving crawler crane 50 to 70 ft. boom double drums for clamshell or dragline work, capacity 62,000 lbs. at 15 ft. radius, weight 120,000 lbs. 100 H.P. AC 2200-440 volt.

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2—10 ton capacity 72'3" span bucket operating 230 volt DC.

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2—450 H.P. 4 cylinder, 4 cycle, solid injection, 225 RPM with or without 300 KW AC 2200 volt generator.

JAW CRUSHERS
10"x15" to 60"x84".

GYRATORY CRUSHERS PRIMARY AND REDUCTION TYPE
All makes and sizes.

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2—4x10 double deck heavy duty.

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2—35 ton Vulcan steam, standard gauge, built 1933, power reverse, air operated fire doors, National Board Boilers, used 11 months for sale or rent.
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1—Vulcan 50 ton 4 wheel saddle tank.
2—Vulcan 25 ton 4 wheel saddle tank.
1—Heisler 42 ton geared locomotive.
1—Plymouth and 1—Whitcomb 8 ton gas.
2—Brookville 8 ton diesel.
1—Plymouth 7 ton gas.

LOCOMOTIVES NARROW GAUGE
2—Porter 21 ton 4 wheel saddle tank 36" gauge.
1—Vulcan 21 ton 4 wheel saddle tank 36" gauge.
2—Heisler 42 ton 36" gauge geared locomotives.
1—Porter 15 ton 4 wheel saddle tank 36" gauge.
2—Vulcan 16 ton gas 36" gauge.
1—Plymouth 16 ton 36" gauge.
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856 "	30"	6	1/8"	1/16"	"
458 "	30"	5	1/8"	1/16"	"
1905 "	24"	5	1/8"	1/32"	"
250 "	24"	6	1/16"	1/16"	Elevator
1298 "	24"	4	1/8"	1/32"	Conveyor
250 "	22"	8	1/16"	1/16"	Elevator
210 "	22"	8	Friction		"
874 "	20"	5	1/8"	1/32"	Conveyor
1765 "	18"	4	1/8"	1/32"	"
750 "	16"	4	1/8"	1/32"	"
1509 "	14"	4	1/16"	1/32"	"
310 "	12"	6	Friction		Elevator
356 "	12"	4	1/16"	1/32"	Conveyor
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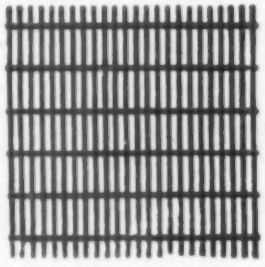

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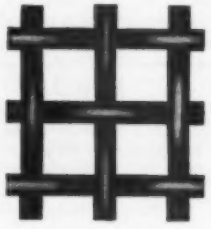

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LONG LIFE . . . proved by actual records of many Gardner-Denver "HA" Compressors under all operating conditions. "After years of continuous service," writes one user, "my compressor is still in perfect condition."

HIGH OVERALL EFFICIENCY . . . assured by large valve areas and unrestricted air passages. Extra large water jackets assure cooler cylinders and cooler air.

TIMKEN MAIN BEARINGS . . . No Gardner-Denver Class "HA" Compressor has ever required replacement of its main bearings.

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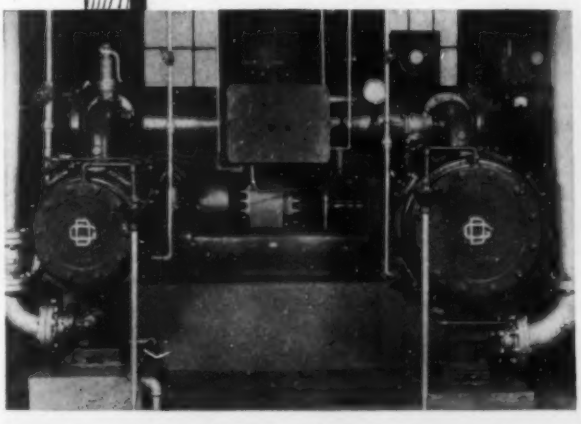

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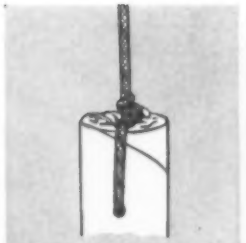
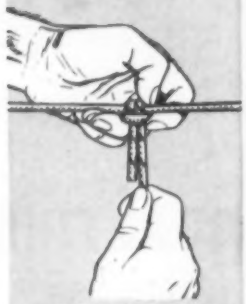
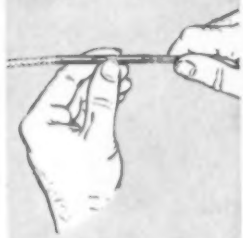


1. Tie through cartridge.



2. Half hitch branch to main line.

3. Connect main line lengths with square knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

Yes, for small holes, too

Primacord will save you money. This lightweight, waterproof, flexible detonating fuse acts as the detonating agent for each cartridge in the drill hole, and connects all holes. One fuse and cap or electric blasting cap attached to the end of the main line detonates the entire blast. Because of the special construction of Primacord, it is possible to detonate holes placed at very close intervals, without danger of cutoffs. Write for the Primacord book.

PB-30

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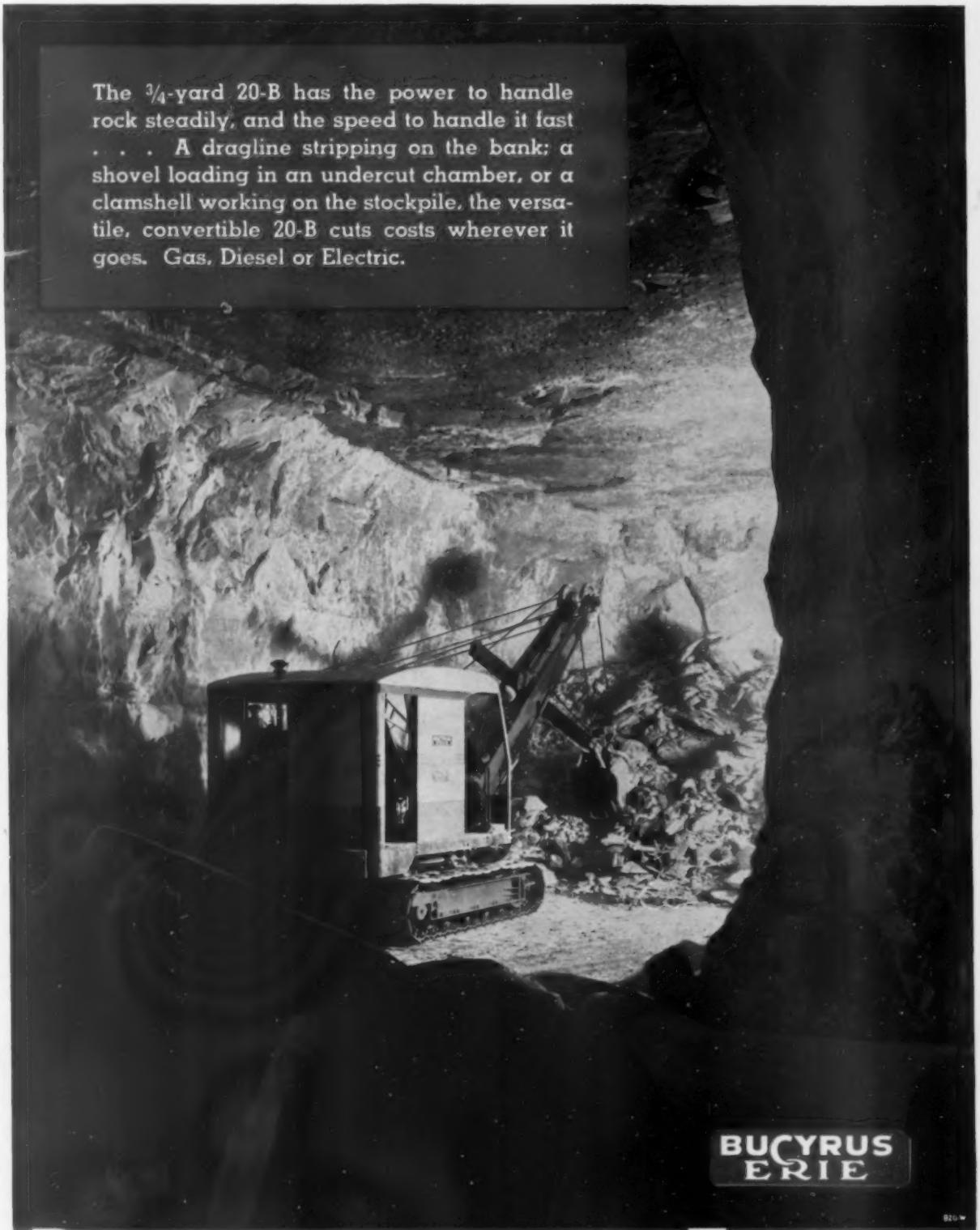

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